

Lebanon TAP Multiuse Path Engineering Study

Lahaye Drive
Lebanon, New Hampshire



Prepared For:

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NHDOT Project No. 41366
Federal Project No. X-A004(617)

October, 2018

Revised February, 2019

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1.0 Project Description

Project Area History

The City of Lebanon, New Hampshire (City) has long been aware of the need to provide more walkable and bikable facilities in the City to enhance safety and connectivity. As early as 1995 the Lebanon Pedestrian and Bicyclist Advisory

Committee (LPBAC) was formed. The committee was charged with making the City more pedestrian and bicycle friendly by encouraging infrastructure improvements that enhance multimodal travel and provide connectivity, and by supporting public awareness and education efforts around ped/bike skills and safety. An interim report and master plan for pedestrian and bicycle facilities was developed from LPBAC as a guide for current and future planning. More recently, a report entitled “Blueprint for Community Trails” (2007) was developed to provide a vision for a citywide pedestrian and bicycle network with connections in the City as well as surrounding cities and towns.

In 2012 the City developed a Master Plan with the vision of providing balanced transportation systems and improved mobility to enhance residents’ quality of life. The plan

- Promotes active living, biking and walking as part of the daily routine
- Establishes and protect the City’s green infrastructure
- Coordinates transportation and economic development to provide viable multimodal choices



Photo 1-1: Covered Bridge over Mascoma River, Lebanon, NH;
<http://www.lebanonnhhistory.org/>

Public Concerns

Input was gathered from the following public meetings and survey.

Table 1-3: Public Input Summary

Meeting	Subject	Date
Kick-Off Meeting	NHDOT/FHWA Project Development Process, Project Status and Schedule	April 10, 2018
Public Concerns Meeting	Project Scope, Schedule, Stakeholder input, Q&A	May 23, 2018
Alternatives Analysis Meeting	Present alternatives and Engineer's Opinion of Probable Construction Cost to public, Q&A	June 13, 2018

Information obtained in the public meetings and surveys revealed the following public concerns regarding pedestrian movements within the project study area:

- Pedestrian safety along Lahaye Drive
- Impact on adjacent private properties and environmental resources
- New multi-use path to be constructed by others along NH Route 120 from Altaria to Centerra Parkway.

Purpose & Need

Purpose Statement

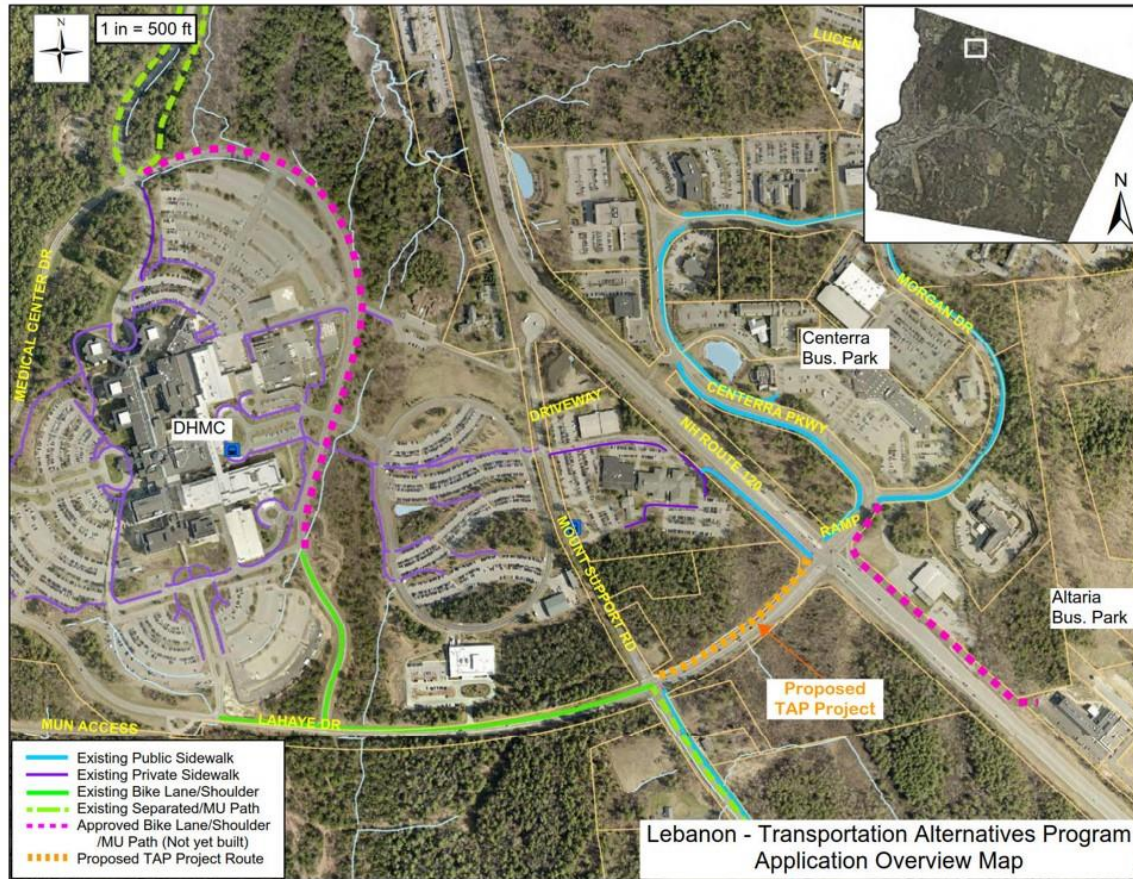
The purpose of this project is to safely convey bicycle and pedestrian traffic within the Lahaye Drive corridor in Lebanon, NH between the Mt. Support Road intersection and existing and proposed facilities adjacent to the NH Route 120 intersection.

Need Statement

- The City of Lebanon has prepared a bicycle and pedestrian transportation plan (attached) showing the existing and proposed facilities including significant infrastructure within the Dartmouth-Hitchcock Medical Center, Centerra Business Park, and Altaria Business Park. The proposed Lahaye Drive corridor is a significant link within this network.

- Average daily traffic on Lahaye Drive and NH 120 are approximately 5,000 vpd and 19,000 vpd, respectively within the project area. Multi-lane vehicular traffic with minimal shoulder widths discourage bicycle and pedestrian use along the roadway.
- Dartmouth-Hitchcock Medical Center is the largest employer in the state of New Hampshire. Their 225-acre campus employs over 7,000 people, generates 500,000 trips per year, and is part of Dartmouth College's Geisel School of Medicine – a top ranked medical school with approximately 3,000 students, administrators and research personnel. This corridor is approximately 2.5 miles south of Dartmouth College which has nearly 10,000 students, administrators and staff.
- Centerra Business Park, across NH Route 120 from Lahaye Drive, includes retail shops, offices and manufacturing facilities, hotels, a restaurant and a courthouse. The City of Lebanon has recently approved the addition of residential units within the business park.
- The City of Lebanon has recently approved an extended-stay hotel and 153 dwelling units in Altaria Business Park along with the 26 units in Centerra Business Park. The Altaria Business Park development will include a new multi-use path from the Business Park along NH Route 120 to the intersection with Centerra Parkway.

Existing Documentation



Lebanon Alternatives Program Application Overview Map (Included in the TAP Grant listing this project as a priority).

2.0 Existing Conditions



Figure 2-1: Lahaye Drive (South), looking East towards NH Route 120

Roadway and Pedestrian Infrastructure

Overview

Mt. Support Road is a paved, two lane roadway (generally one 12-foot wide lane of traffic in each direction with 1-foot wide shoulders). It is orientated in a North-South manner. There is an existing 10-foot wide multi-use path located on the east side of Mt. Support Road that terminates at the northeast quadrant of the intersection. The northbound roadway approach to the Lahaye Drive intersection consists of a left-thru and a right turn lane. The southbound roadway approach consists of a left and a thru-right turn lane. There are no residences in the immediate area of the project. The existing landscape is generally flat and forested. For additional photos of the existing conditions see Appendix L.

Lahaye Drive is a paved three lane roadway (two 12-foot wide lanes westbound and one 12-foot wide lane eastbound with 3-foot wide shoulders). It is generally orientated in an East-West manner. There are no pedestrian or bicycle facilities along the project length other than limited paved shoulders on the roadway. The westbound roadway approach to the Mt. Support Road intersection consists of a left, thru, and right turn lane with no median. Lahaye Drive shoulders at the Mt. Support intersection are 1-foot wide. The eastbound approach to the NH Route 120 intersection consists of a left-thru, and two right turn lanes, a 6-foot wide median and two 12-foot wide receiving lanes. Lahaye Drive shoulders at the NH Route 120 intersection are 4-feet wide. There are no residences along this section of roadway. The existing topography is moderately sloped downward from the roadway. At the bottom of the slopes are wetlands

which are forested. There are guardrail runs on either side of the roadway to protect against the slopes and water hazards.

NH Route 120 is a paved four lane roadway (two 12-foot wide lanes northbound, two 12-foot wide lanes southbound and 3-foot wide shoulders). It is orientated in a North-South manner. There is a 5-foot paved wide sidewalk located on the West side of NH Route 120, North of the Lahaye Drive/ Centerra Parkway Intersection. The northbound approach to the intersection consists of two left, two through, and one right turn lane and is separated from the southbound traffic by a curbed, concrete median. The right turn lane is a slip lane that is protected by a curbed grass island. The southbound approach to the intersection consists of a left, thru, and through-right turn movements and is separated from the northbound traffic by a curbed concrete median. Within the project vicinity there are no commercial/residential properties with direct access points to the roads. Additionally, the topography is generally flat and either grassed or forested.

Centerra Parkway is a four lane roadway (two 12-foot wide lanes eastbound, two 12-foot wide lanes westbound and no shoulders). It is orientated in an East-West manner at the intersection with NH Route 120 and Lahaye Drive. The westbound approach to the intersection consists of a left, left-thru, and right turn lanes and is separated from the eastbound traffic with a curbed, grassed median.

Crosswalks

There are no mid-block crosswalks located within the project area. At the Mt. Support Road intersection, there are two crosswalks: One that crosses Lahaye Drive on the East side of Mt. Support Road and one that crosses Mt. Support Road to the North of Lahaye Drive. At the NH Route 120 intersection, there is only one crosswalk located on NH Route 120, to the North of Lahaye Drive.

Curbing

At the Mt. Support intersection there is a small amount of curbing located at the Southeast quadrant of the intersection to separate vehicle traffic from the existing sidewalk infrastructure and approximate 5-foot grass strip. There is no curbing along Lahaye Drive between the intersections. At NH Route 120, there is curbing located at the edges of pavement along NH Route 120. There are curbed, concrete medians on the northbound and southbound approaches that separate traffic and act as a pedestrian refuge on the southbound approach. The Lahaye Drive approach has curbing near the intersection for storm water purposes and also has a curbed, paved median to separate eastbound and westbound traffic. The Centerra Parkway intersection has curbing located at the edges of pavement for storm water and pedestrian safety purposes. There is a curbed, grassed island to separate eastbound and westbound traffic. Additionally, there is a grassed, splitter island that is curbed located at the southeast quadrant of the intersection for NH Route 120 northbound, right turn movements.

Surface Treatment

Within the study area the roadway is paved with bituminous asphalt concrete. The paved surface is in good condition with minor cracking beginning to show

Pavement Markings

Pavement markings at the Mt. Support Road/ Lahaye Drive intersection include stop bars, crosswalks, white lane and edge line markings, yellow centerline and turn lane assignment markings. Lahaye Drive consists of a double yellow centerline that acts as a median, solid white edge line markings and dashed white lane markings. The NH Route 120/ Lahaye Drive/ Centerra Parkway intersection consists of stop bars, crosswalks, solid and dashed white lane and edge line markings, yellow centerline and turn lane assignment markings

Signals

Both the Mt. Support Road and NH Route 120 intersections are signalized. At the Mt. Support Road intersection all left turning movements must yield to oncoming traffic (permissive) with the exception of the Mt. Support Road southbound left turn movement which has a dedicated left turn arrow. Mt Support Road northbound has certain phases where there are no right turns on red allowed as further protection for pedestrians. Additionally, there are pedestrian/signal (concurrent) phases that are non-dedicated and occur during the major left-through-right turn movements that parallel the pedestrian movement. At the NH Route 120 intersection, the left turning movements from NH Route 120 are exclusive i.e. a double left turn movement. The Lahaye Drive and Centerra Parkway left turning movements are also dedicated, but they occur during the corresponding through and right turn movements for that approach. There is an exclusive pedestrian phase that occurs after the NH Route 120 through/ right turn movements phase.

Signage

There are standard regulatory, warning, and guide signage within the project area. Generally, the signage appears to conform to the Manual on Uniform Traffic Control Devices (MUTCD) and/or New Hampshire Department of Transportation (NHDOT) criteria.

Geometry

The Mt. Support Road horizontal geometry is generally straight within the vicinity of the project. The vertical geometry is relatively flat North of the intersection and a slight down grade south of the intersection. Sight distance appears to be adequate, both horizontally and vertically.

The Lahaye Drive horizontal geometry is on a shallow to moderate curve to the right while looking at the Lahaye Drive/ Mt. Support Road intersection from the East. The vertical geometry is relatively flat through the project area. Sight distance appears to be adequate, both horizontally and vertically. Additionally, Lahaye Drive intersects Mt. Support Road at an approximate perpendicular angle.

The proposed path profile will generally follow the grades of the existing roadway. Where the existing roadway grades are all below 5% in grade, it can be also concluded that the path profile will meet ADA criteria for grade.

The NH Route 120 horizontal geometry is straight within the vicinity of the project. The vertical geometry is relatively flat within the project vicinity. Sight distance appears to be adequate, both horizontally and vertically. NH Route 120 bisects with Lahaye Drive and Centerra Parkway at an approximate perpendicular angle.

The Centerra Parkway horizontal geometry is straight as the alignment approaches the intersection. Outside the project limits there is a sharp horizontal curve that deflects to the left from the intersection. Although it is sharp, it appears to offer adequate stopping sight distance. The vertical geometry is on a slight to moderate downhill grade approaching the intersection from the East. The vertical geometry appears to offer adequate stopping sight distance.

Speed

The posted speed limit for Mt. Support Road is 25 mph. There is only one sign to confirm this limit and is located to the south of the Lahaye Drive intersection.

The posted speed limit for Lahaye Drive is 25 mph. Lahaye Drive does not have a speed limit sign from NH Route 120, traveling west. There are however several speed limit signs for eastbound traffic, but outside the project limits.

The posted limit along NH Route 120 is 40 mph. Anecdotally, actual speeds along this corridor often exceed that limitation. There are two speed limit signs located to the North and South of the Lahaye Drive/ Centerra Parkway intersection.

The posted speed limit for Centerra Parkway is 25 mph. There is a speed limit sign located near the intersection with NH Route 120 for eastbound traffic. There are also speed limit signs for westbound traffic, outside the project limits.

Crashes

Crash Data was obtained from the City of Lebanon Police and NHDOT. The data included crashes at the Mount Support Intersection, along Lahaye Drive, at the NH Route 120 intersection and on Centerra Parkway. Only one crash was associated with Lahaye Drive outside the intersections. There are some inconsistencies between the data sources which may reflect minor crashes where City police assisted due to traffic volumes, but were not officially reported to the State. The NHDOT data included 2013-2017 with an average of five crashes per year distributed across the Mount Support Intersection, Lahaye Drive, NH 120 Intersection and Centerra Parkway. Most of the crashes occurred on Centerra Parkway. The City data includes 46 crashes between 2016-2018. The crashes were all Property Damage Only (PDO) crashes. No bike or pedestrian crashes were reported. The available data did not allow for any conclusions to be drawn.

Utilities

Overhead Utilities

Mt. Support Road has poles, electric, telephone and cable running along the West side of the roadway. NH Route 120 has poles, electric, telephone and cable running along the East side of the roadway. Lahaye Drive and Centerra Parkway have no overhead utilities through the project area.

Underground Utilities

In the Mt. Support Road area, there is a 12-inch water main located on the West side of the roadway and runs parallel to Mr. Support Road. Several supplemental feeder water lines connect to the main at the Mt. Support Road/ Lahaye Drive intersection. There are also telephone and electric lines located at the intersection.

Along Lahaye Drive, there is a telephone line on the South side of the roadway. It is located beside or beneath the roadway. There is also a water line running on the North side of the roadway. It is located either outside or underneath the roadway.

At the NH Route 120 intersection area there is a water main on the East side of the intersection. It begins at a fire hydrant located in the southeast quadrant of the intersection and terminates at the water line paralleling Lahaye Drive and Centerra Parkway. A telephone line crosses NH Route 120 South of the intersection. There are also underdrain runs located on either side of NH Route 120.

Along Centerra Parkway there is a telephone line that crosses Centerra Parkway just East of the NH Route 120 intersection. A water line is located beneath the westbound travel lane that is a continuation of the Lahaye Drive water line. There is also a sewer line located in the eastbound travel lane, outside of the proposed project limits.

Drainage

Stormwater exits the roadway via sheet flow along Lahaye Drive. The NH Route 120 intersection area is curbed and collects stormwater via catch basins that exit to the surrounding wetland areas. The Mt. Support Road intersection drains into a ditch on the north side of Lahaye Drive and will need to be redesigned if the northern alternative is selected.

Right of Way

The existing right-of-way at Mt. Support Road, Centerra Parkway and Lahaye Drive is City-owned, and maintained. The existing right-of-way along NH Route 120 is State-owned, and maintained. The right-of-way for Lahaye Drive and NH Route 120 is controlled access. The limits of right-of-way have been mapped based on research performed by a Licensed New Hampshire Professional Land Surveyor.

It is anticipated that permanent path easements will be required. Depending upon the alternative selected, a permanent retaining wall easement may also be required. Drainage will need to be modified to facilitate construction of the path. As such, permanent drainage

easements will be required. For temporary easements, it is anticipated that slope and construction will be required.

Land acquisition is not anticipated as part of this project. Permanent easements will be pursued for areas likely to require future maintenance including slopes with a ratio of 2 horizontal to 1 vertically or greater and drainage easements for watercourses. Utility Easements are not anticipated, but more research will be required to verify that all existing utilities have been delineated. Temporary easements will be obtained in other work areas.

3.0 Design Standards and Guidelines

The following Federal, State, Local and common industry circulated design guidelines, standards and regulations were considered for the Project's proposed design alternatives:

Table 3-1: Project Design Standards and Guidelines	
NHDOT Design Guidelines, Standards and Regulations	<ul style="list-style-type: none"> • NHDOT <i>Highway Design Manual</i>, latest revision • NHDOT <i>Standard Specifications for Road and Bridge Construction</i>, 2010 • NHDOT LPA Manual 2017 • NHDOT Standard Plans for Road Construction, 2010 • NHDOT Sidewalk Curb Ramp Details, 2018
Federal Design Guidelines, Standards and Regulations	<ul style="list-style-type: none"> • 2012 AASHTO <i>Guide for the Development of Bicycle Facilities</i>, 4th Edition • 2018 AASHTO <i>A Policy of Geometric Design of Highways and Streets</i> • 2011 AASHTO <i>Roadside Design Guide</i>, 4th Edition • Americans with Disabilities Act Accessibility Guidelines (ADAAG) • 2011 Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way • 2009 FHWA <i>Manual on Uniform Traffic Control Devices</i> (MUTCD) and its latest revisions

4.0 Resource Review and Documentation

The Lebanon Multi-use Path Project is funded through the Transportation Alternatives Program (TAP), and is municipally managed by a Local Public Agency (LPA). Due to the inclusion of federal funds, the project must comply with the National Environmental Policy act of 1970 (NEPA). NEPA requires that federal agencies consider the environmental impacts to proposed actions and reasonable alternatives to those actions.

FHWA determines the project classification as a result of the NEPA Process as follows:

- Class I: Actions that significantly affect the environment require the preparation of an Environmental Impact Statement (EIS)
- Class II: Actions that do not individually or cumulatively have a significant environmental effect require the preparation of a Categorical Exclusion (CE) or Programmatic CE.
- Class III: Actions in which the significance of the environmental impact is not clearly established require the preparation of an Environmental Assessment (EA) to determine the appropriate environmental document required. This may result in a “Finding of No Significant Impact” (FONSI).

To determine under which level a project will be reviewed, the project team completes a Categorical Exclusion Programmatic Determination Checklist to gather pertinent information then reviews it with the relevant regulatory agencies at the state and federal levels. This process helps assure that impacts are avoided to the maximum extent practicable, unavoidable impacts are minimized, and that appropriate mitigation for any impacts is included in the design. The full NEPA process requires the selection of the alternative that is the least environmentally-damaging, practicable alternative (LEDPA).

Wetland resource areas were flagged in along Lahaye Drive, North and South of the roadway. It is anticipated that any build alternative selected will result in wetland impacts.

As part of the Categorical Exclusion process, the project team will coordinate with the two NHDOT resource agencies, the Cultural Resource Agency and the Natural Resource Agency, through monthly coordination meetings to review proposed designs, design alternatives, and potential cultural or natural resource impacts near the project location.

Initial consult with NH Natural Heritage Bureau determined that there are no known threatened and rare species within the project area. Additional coordination with the New Hampshire Fish & Game will be required as part of the Preliminary Design Phase of the project (See appendix for Natural Heritage Bureau Reports). A meeting was held with the NHDOT Natural Heritage Committee on August 15, 2018. A Cultural Heritage Committee meeting is not anticipated due to the limited resources identified. Federally threatened and endangered species lists will also

be coordinated with the expectation that bat species will also be included. A follow up meeting will be scheduled when actual impacts of the selected alternative have been quantified.

5.0 Design Alternatives Analysis

Alternative 1 – No Build Option

The no-build alternative involves leaving the study segment unchanged from existing conditions. Lahaye Drive would continue to not have pedestrian facilities located along the roadway. This alternative would not meet the Purpose and Need Statement, including improvement of safety and connectivity.

Alternative 2 – Multi-use Path North (Embankment)

Alternative 2 consists of a 10-foot wide multi-use path along the North side of Lahaye Drive, connecting the Mt. Support Road multi-use path to the sidewalk on NH Route 120 and connecting to the multi-use path on Centerra Parkway to be constructed by others. The typical cross section in the study consists primarily of an uncurbed section with 3-foot aggregate shoulder (for existing guardrail), 5-foot grass swale, 3-foot grass shoulder, 10-foot multi-use path, 3-foot grass shoulder with 5-foot high chain link fencing, and a vegetated embankment that can vary in slope but is typically 2:1 horizontal to vertical. The typical section will be finalized during Preliminary Design.

The finished grade of the path would be at approximately the same elevation as the roadway edge of pavement. This would collect stormwater in the 5-foot grass swale. Catch basins and corresponding piping would be added in the swale and outlets to the toe of slope.

During public meetings, lowering of the path down the roadway embankment was discussed. This would have reduced environmental impacts and construction costs. As this alternative would be used during the wintertime, there were concerns about plowing operations with bicyclists and pedestrians being struck by the waves of snow.

Resources along alternative 2 include wetlands located at the roadway toe of slope. Additionally, there are trees that would need to be cleared to facilitate construction of the embankment. These trees may be prime bat habitat. This alternative impacts approximately 17,500 square feet of wetlands and will require about 0.3 acres of clearing.

The estimate of probable construction cost for Alternative 2 is \$480,000. This cost includes a 25% contingency. It also includes an estimated wetland impact mitigation fee. An itemized breakdown of probable construction cost is included in the appendix.

Alternative 3 – Multi-use Path South (Embankment)

The typical section for Alternative 3 is the same as Alternative 2, except that it is on the South side of the Lahaye Drive. This alternative would require pedestrians to cross Lahaye Drive at the

NH Route 120 intersection to access the existing facilities. Alternatively, a crosswalk could be installed along NH Route 120, Centerra Parkway as well as construction of sidewalk and ramps at the splitter island to access the same existing pedestrian facilities. Additionally, sidewalk ramps and a crosswalk will need to be installed on Lahaye Drive to access the NH Route 120 sidewalk facilities. Otherwise, pedestrians would need to cross three roadways to gain access to the pedestrian facility.

There would be a moderate to significant clearing increase (0.5 acres) as compared to alternative 2 to facilitate construction of the embankment. This would be a potential increase in bat habitat impacts. Conversely, there is a slight reduction in the potential wetland impacts (about 16,700 square feet) for this alternative as compared to alternative 2.

The estimate of probable construction costs for Alternative 3 on Segment 1 is \$445,000. This cost includes a 25% contingency. It also includes an estimated wetland impact mitigation fee. An itemized breakdown of probable construction cost is included in the appendix. Alternative 3 would also likely include additional ROW impacts that would not be required for Alternative 2.

Alternatives 2A – Multi-use Path North (wall)

This alternative is identical to alternative 2, with the exception that a retaining wall would be constructed to the outside of the roadway and path. It would be located next to the 3-foot wide grass shoulder with 5-foot high chain link fence.

This alternative would offer a moderate decrease to the wetlands impacts (about 14,600 square feet) as compared to the impacts identified in alternative 2. There would be similar clearing impacts of approximately 0.3 acres compared to alternative 2. Additionally, there would be less right-of-way impacts as compared to alternative 2.

The estimate of probable construction cost for this alternative is \$740,000. This cost includes a 25% contingency. It also includes an estimated wetland impact mitigation fee. An itemized breakdown of probable construction cost is included in the appendix.

Alternative 3A - Multi-Use Path South (wall)

This alternative is identical to alternative 3, with the exception that a retaining wall would be constructed to the outside of the roadway and path. It would be located next to the 3-foot wide grass shoulder with 5-foot high chain link fence.

This alternative would offer a moderate to significant decrease to the wetlands impacts (about 10,810 square feet) as compared to the impacts identified in alternative 3. There would be a moderate to significant decrease to the clearing impacts (about 0.3 acres) as compared against alternative 3. Additionally, there would be less right-of-way impacts as compared to alternative 3.

The estimate of probable construction costs for this alternative is \$844,000. This cost includes a 25% contingency. It also includes an estimated wetland impact mitigation fee. An itemized breakdown of probable construction cost is included in the appendix.

6.0 Conclusions and Recommendations

Alternative 1 – The strengths of this alternative include zero construction costs, zero wetland and clearing impacts and zero impacts to utilities and drainage. Weaknesses to this alternative are that it does not meet the purpose and need statement, doesn't improve safety or connectivity to the area.

Alternative 2-The strengths of this alternative include the cost of construction. This alternative is one of the lowest construction costs of the four alternatives considered. The clearing impacts are also one of the lowest of the alternatives considered. This alternative meets the purpose and need statement, improves safety and provides connectivity. Additionally, there is less infrastructure to construct to connect to existing facilities as compared against alternative 3 and 3A. Weaknesses include the amount of wetland impacts. It is the highest of the alternatives considered.

Alternative 3- The strengths of this alternative include the cost of construction. This alternative is the lowest construction cost of all build alternatives. This alternative meets the purpose and need statement. Weaknesses for this alternative include the increase wetland and clearing impacts. This alternative is one of the highest compare to other alternatives. Additionally, this alternative does not link with any existing pedestrian infrastructure at NH Route 120. If this option is selected additional pedestrian crosswalks and ramps would need to be constructed as part of the project.

Alternative 2A-The strengths of this alternative include the marginal decrease in wetland impacts as compared against alternative 2. There would be identical clearing impacts as compared to alternative 2. Weaknesses include the cost of construction. This alternative has one of the highest construction cost compared to other alternatives.

Alternative 3A-The strengths of this alternative include the moderate to significant decrease in wetland impacts as compared against alternative 3. There is a 35% reduction in wetland impacts as compared against alternative 3. There would be moderate to significant decrease in clearing impacts as compared to alternative 3. Weaknesses include the cost of construction. This alternative has the highest construction cost of all build alternatives.

Lebanon-Lahaye Drive Alternatives Matrix

Alternative	Purpose & Need		Environmental		w/o Mit.	w/ Mit.
	Improve Safety	Improve Connectivity	Wetland Impacts	Clearing	Construction Cost	Construction Cost
Alternative 1-No Build	No	No			\$0	\$0
Alternative 2-North Path (Earth Slope)	Yes	Yes	17,500 SF	0.3 A	\$400,000	\$480,000
Alternative 2A-North Path (Retaining Wall)	Yes	Yes	14,600 SF	0.3 A	\$680,000	\$740,000
Alternative 3-South Path (Earth Slope)	Yes	Yes	16,700 SF	0.5 A	\$455,000	\$525,000
Alternative 3A-South Path (Retaining Wall)	Yes	Yes	10810 SF	0.3 A	\$794,000	\$844,000

Traffic Control

All of the alternatives that were progressed would be behind the existing guardrail. For construction it is anticipated that a short segment of the road would be impacted where construction access would be provided at the Mt Support Road and NH Route 120 ends of the project near the limits of the guardrail. Total impact to the road would not exceed ten feet which could be accommodated with minor shifts on the existing roadway where excess width is available on a temporary basis.

Permitting

Alteration of Terrain (AOT) permitting is not anticipated for any of the alternatives with the typical impact of approximately 30,000 square feet and the AOT threshold of 100,000 square feet. Each alternative will require a wetlands permit. It is anticipated that mitigation will be required either in concert with other City projects or in lieu fee.







Recommendations:

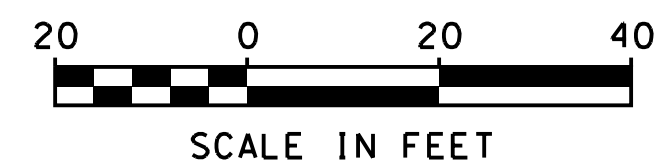
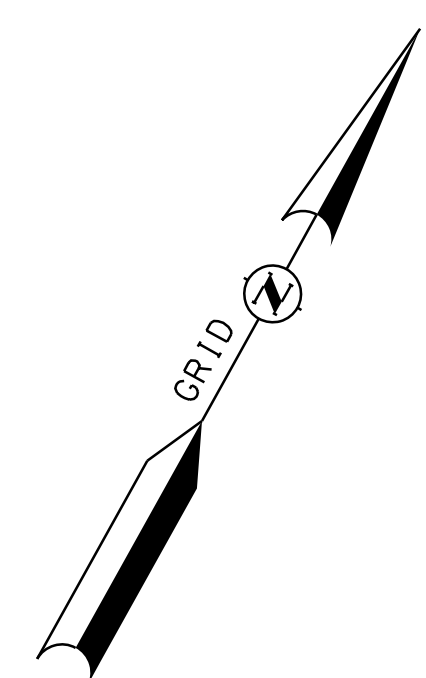
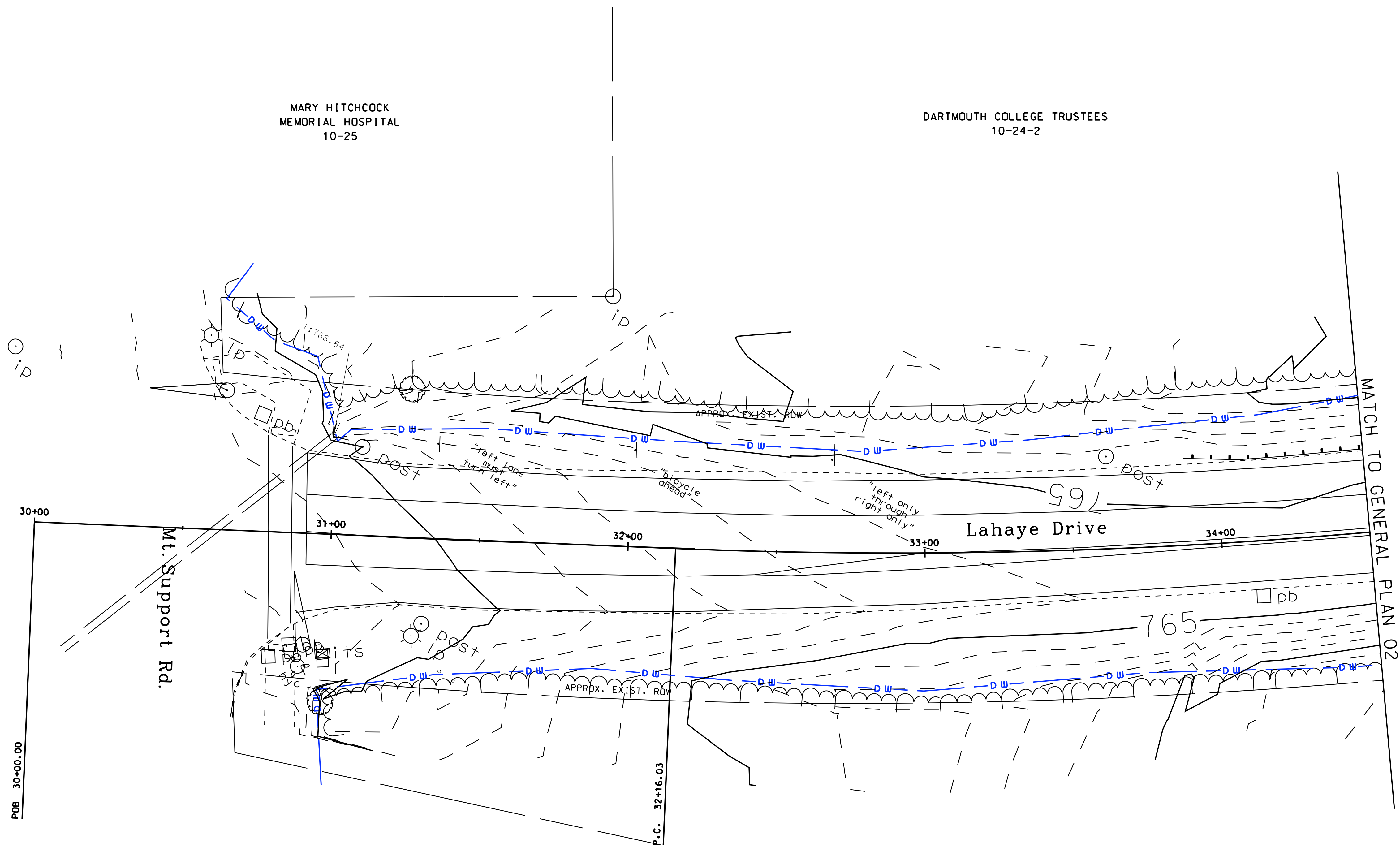
Based upon the findings during the Engineering Study, Alternative 2 is the Proposed Action. Alternative 2 fulfills the Purpose and Need statement, improves safety and connectivity, is within the approved construction budget and has the least impact on the traffic flow at the NH Route 120 intersection. Although this alternative has the highest amount of wetland impacts, the advantages of this alternative outweigh the limited reduction of wetlands realized from the other alternatives and the significant cost increases required for those reductions.

APPENDIX A

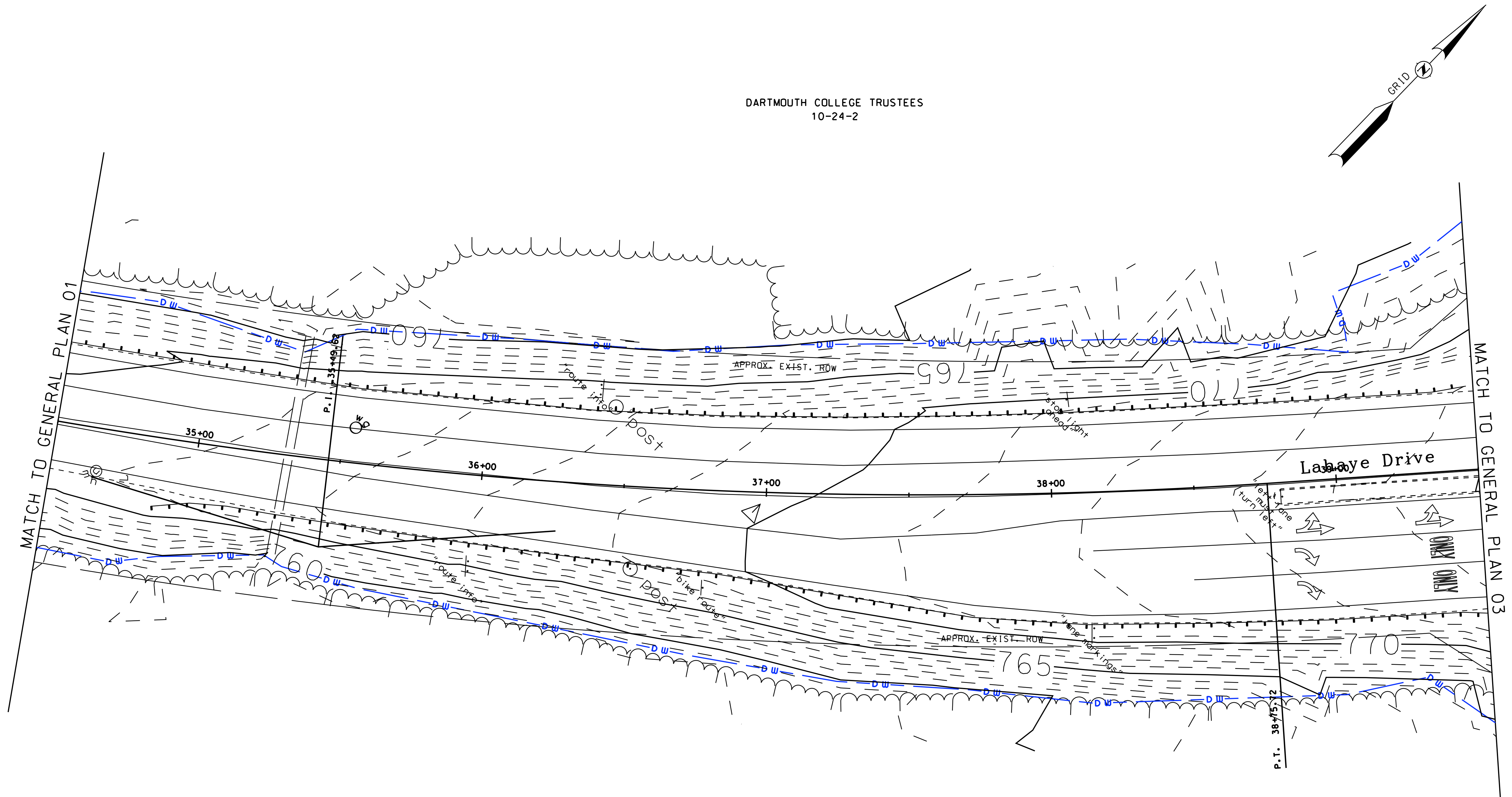
BASE MAPS

PLAN LEGEND

	PATH
	PATH SHOULDER
	DELINEATED WETLAND
	FILL LIMIT
	EXCAVATION LIMIT
	APPROX. LOCATION PROPOSED FENCE

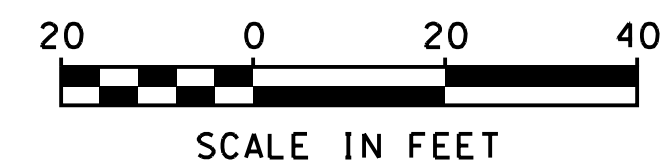
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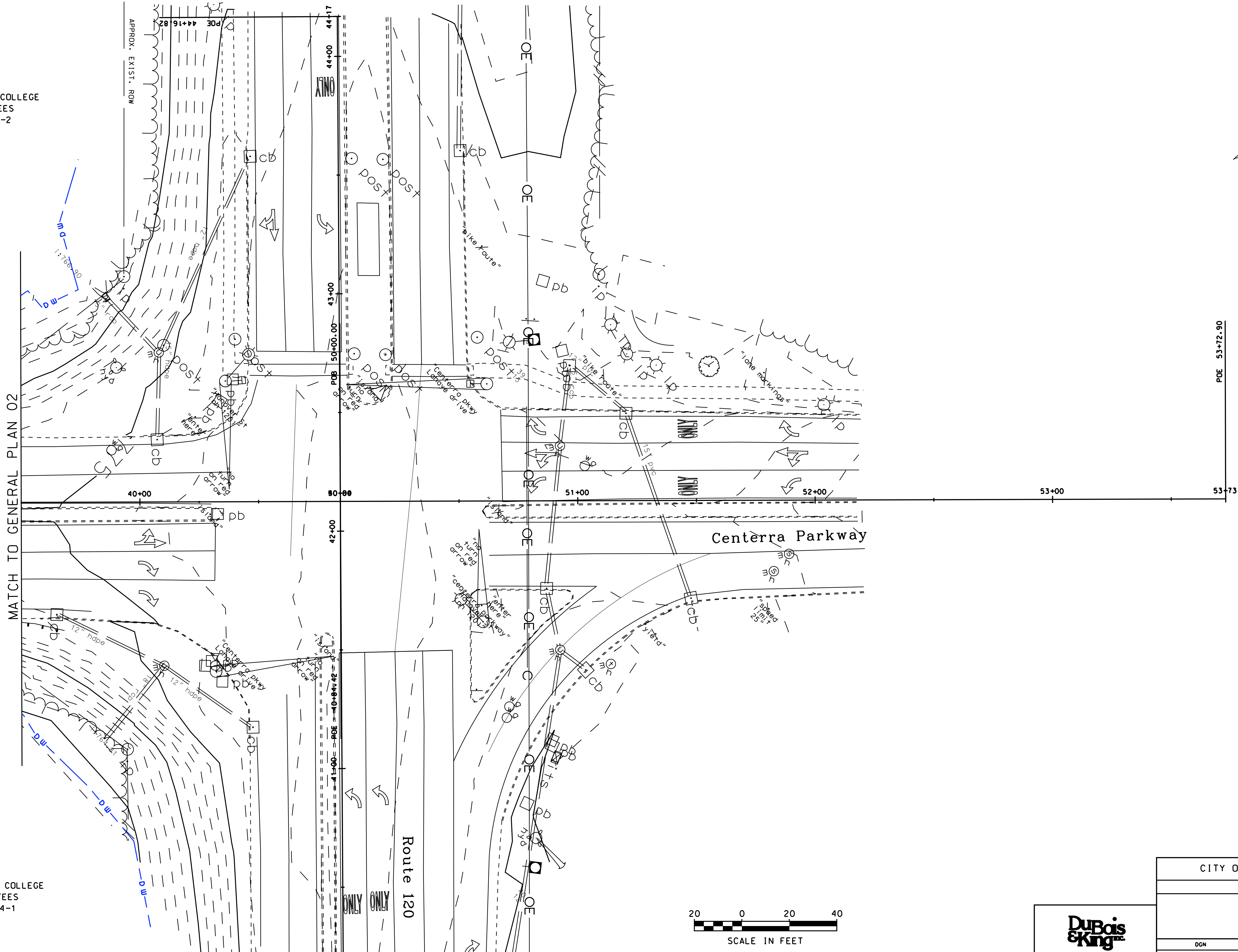
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TRUSTEES
10-24-2

DARTMOUTH COLLEGE
TRUSTEES
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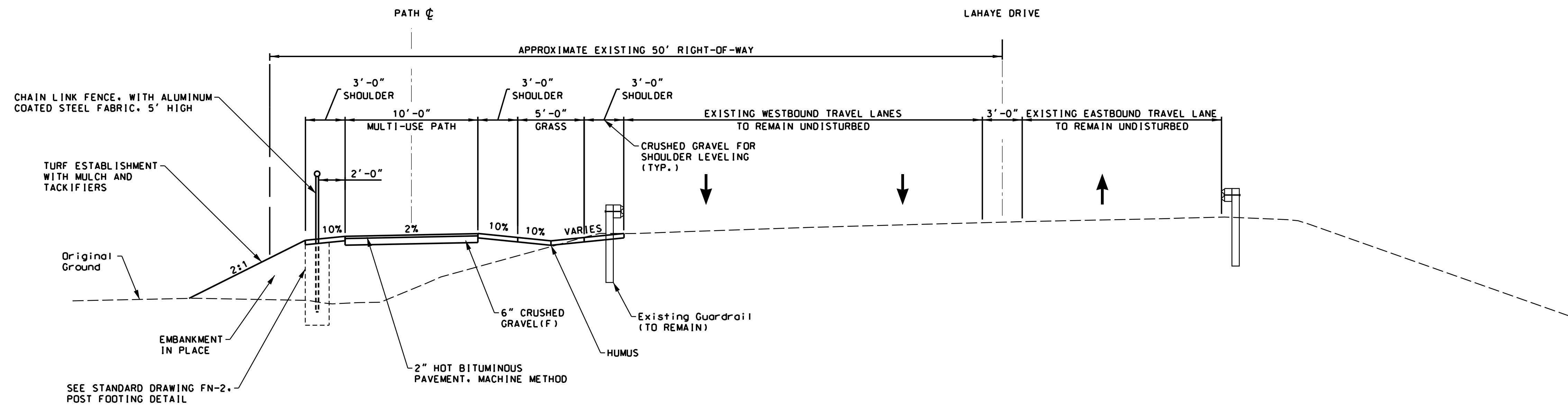
CITY OF LEBANON, NEW HAMPSHIRE

BASE PLAN 03

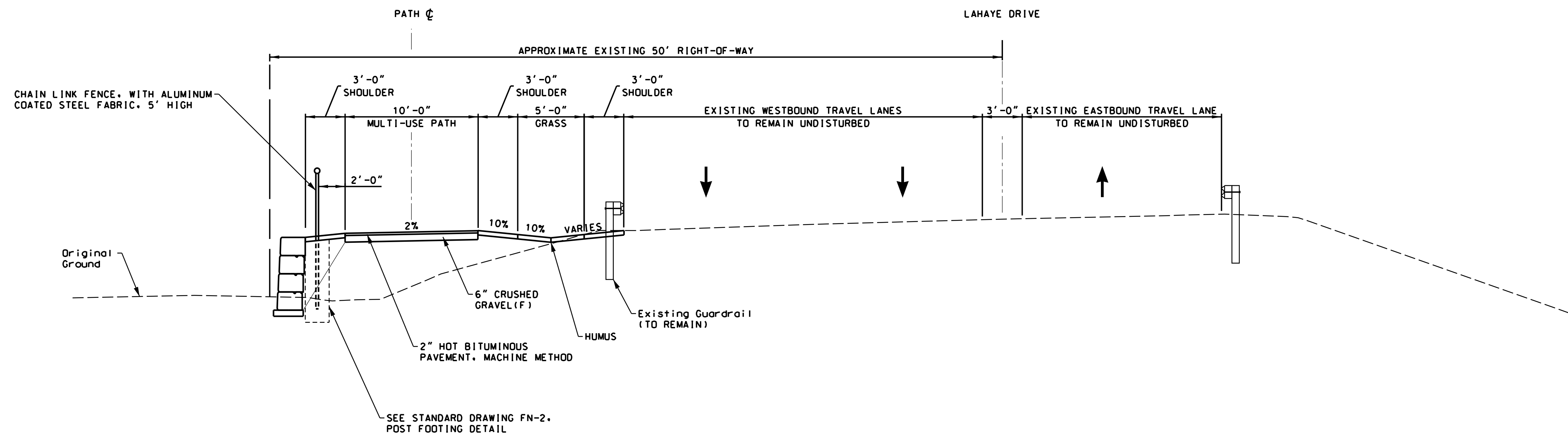
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APPENDIX B

CONCEPT TYPICAL SECTIONS

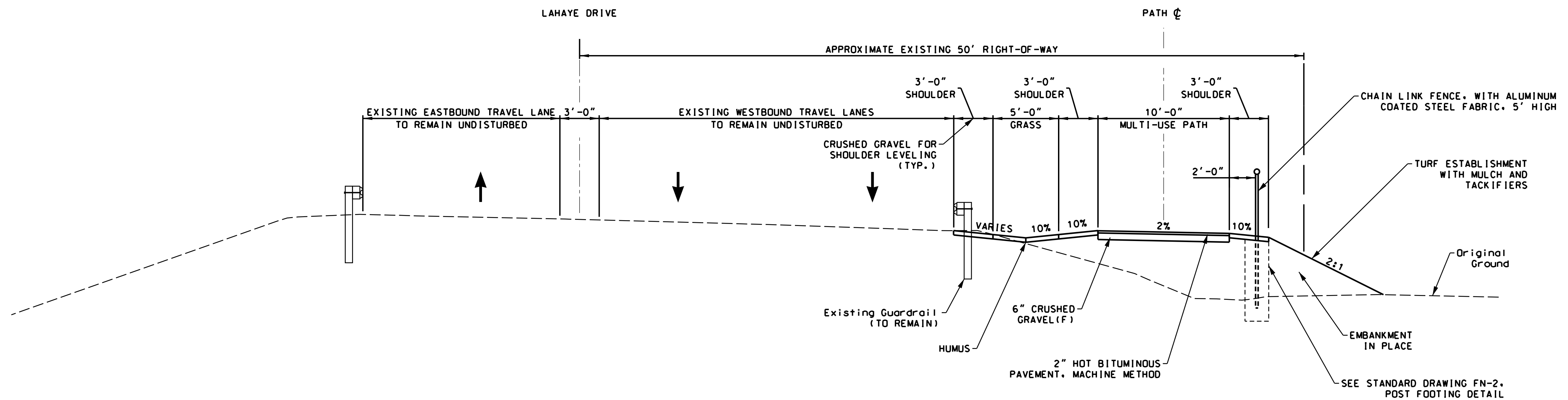


LAHAYE DRIVE
10' MULTI-USE PATH NORTH - EMBANKMENT
ALTERNATIVE 2

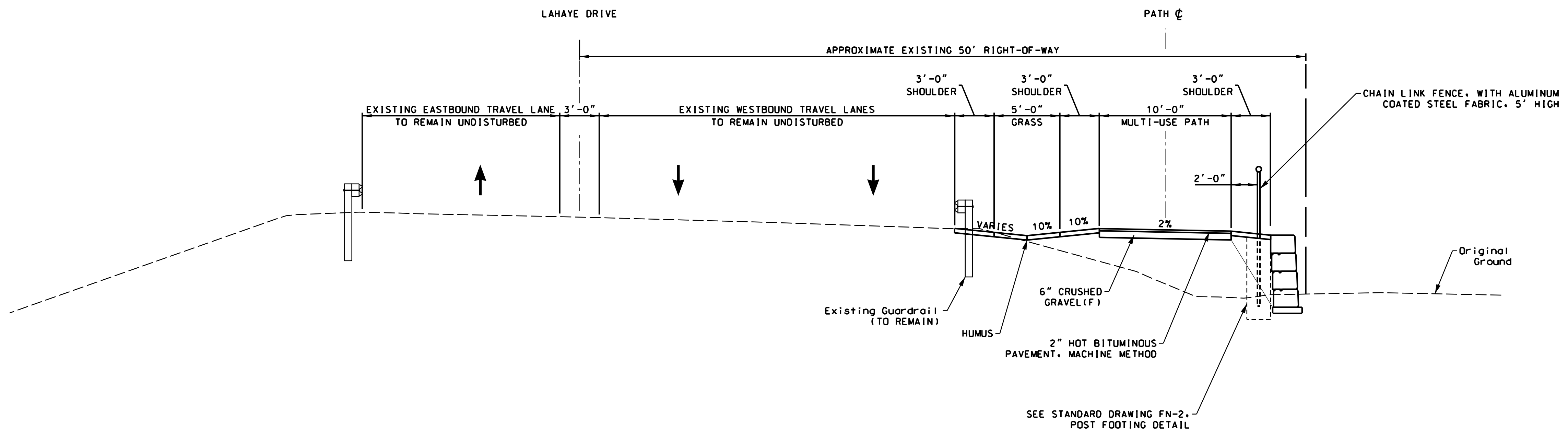


LAHAYE DRIVE
10' MULTI-USE PATH NORTH - WALL
ALTERNATIVE 2A

CITY OF LEBANON, NEW HAMPSHIRE			
TYPICAL SECTIONS			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
41366+yp.dgn	41366	X	



LAHAYE DRIVE
10' MULTI-USE PATH SOUTH - EMBANKMENT
ALTERNATIVE 3



LAHAYE DRIVE
10' MULTI-USE PATH SOUTH - WALL
ALTERNATIVE 3A







CITY OF LEBANON, NEW HAMPSHIRE			
TYPICAL SECTIONS			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
41366+typ.dgn	41366	X	

APPENDIX C

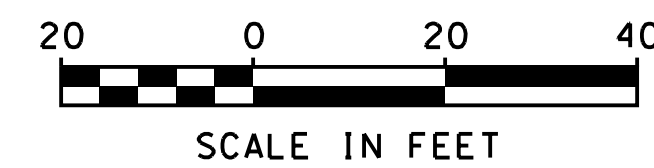
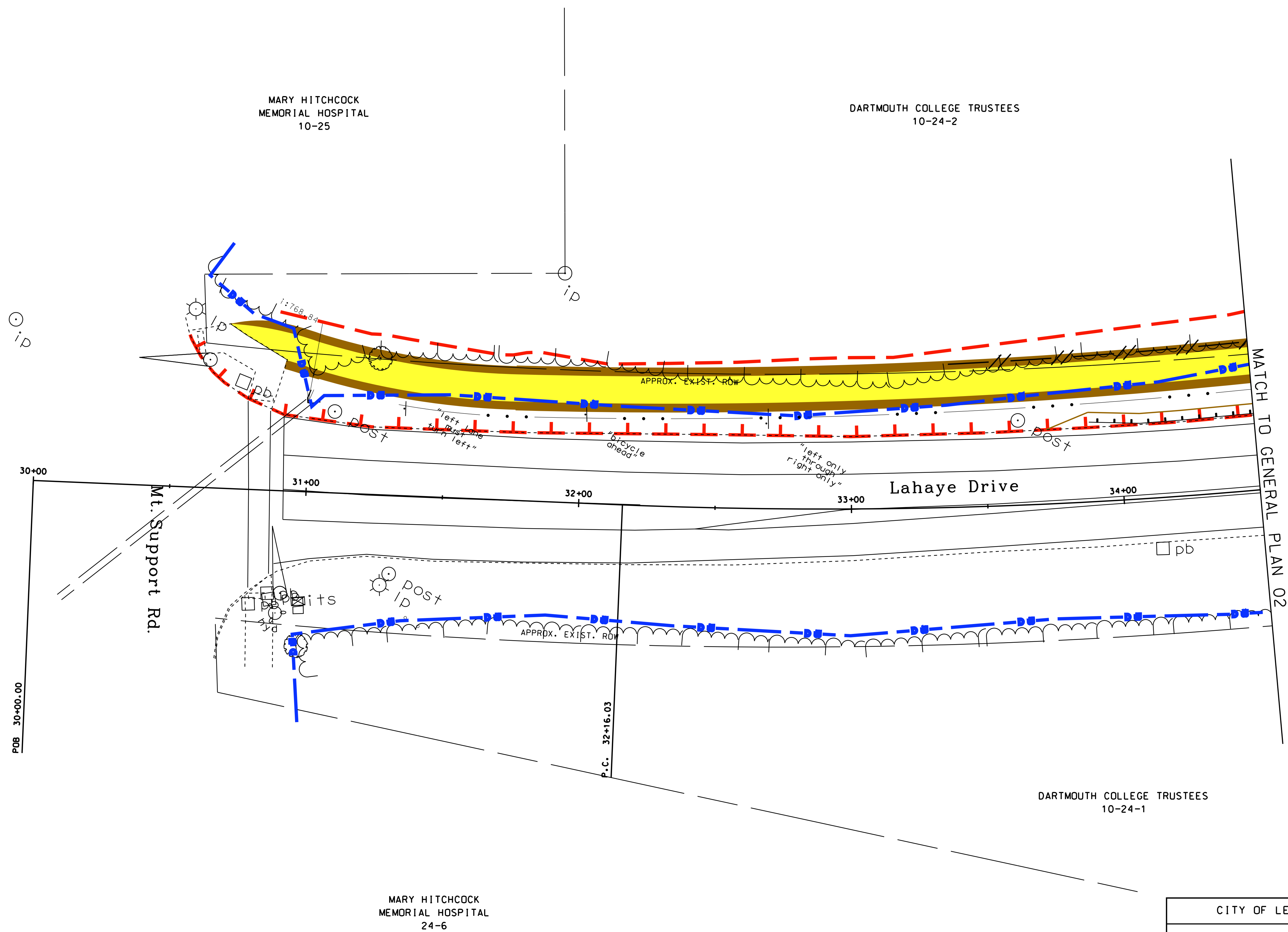
CONCEPT PLANS

ALTERNATIVES 2, 2A, 3 AND 3A

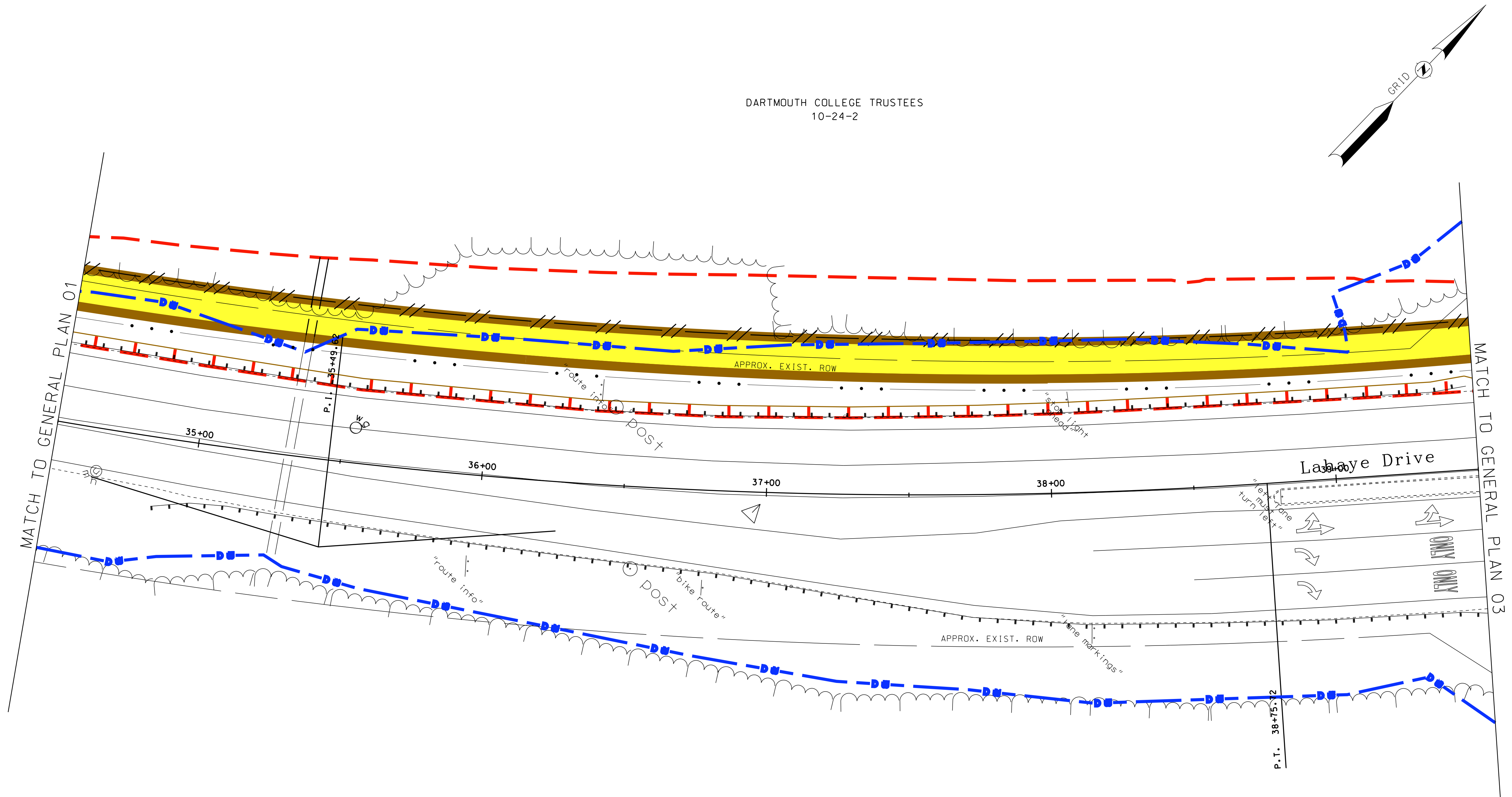
PLAN LEGEND

	PATH
	PATH SHOULDER
	DELINEATED WETLAND
	FILL LIMIT
	EXCAVATION LIMIT
	APPROX. LOCATION PROPOSED FENCE

SDR PROCESSED	DATE	REVISIONS AFTER PROPOSAL			
NEW DESIGN	DATE	NUMBER	DATE	STATION	DESCRIPTION
SHEET CHECKED	DATE				
AS BUILT DETAILS	DATE				



CITY OF LEBANON, NEW HAMPSHIRE			
<p style="text-align: center;"><i>ALTERNATIVE 2, PLAN 01</i></p>			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

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DARTMOUTH COLLEGE TRUSTEES
10-24-1

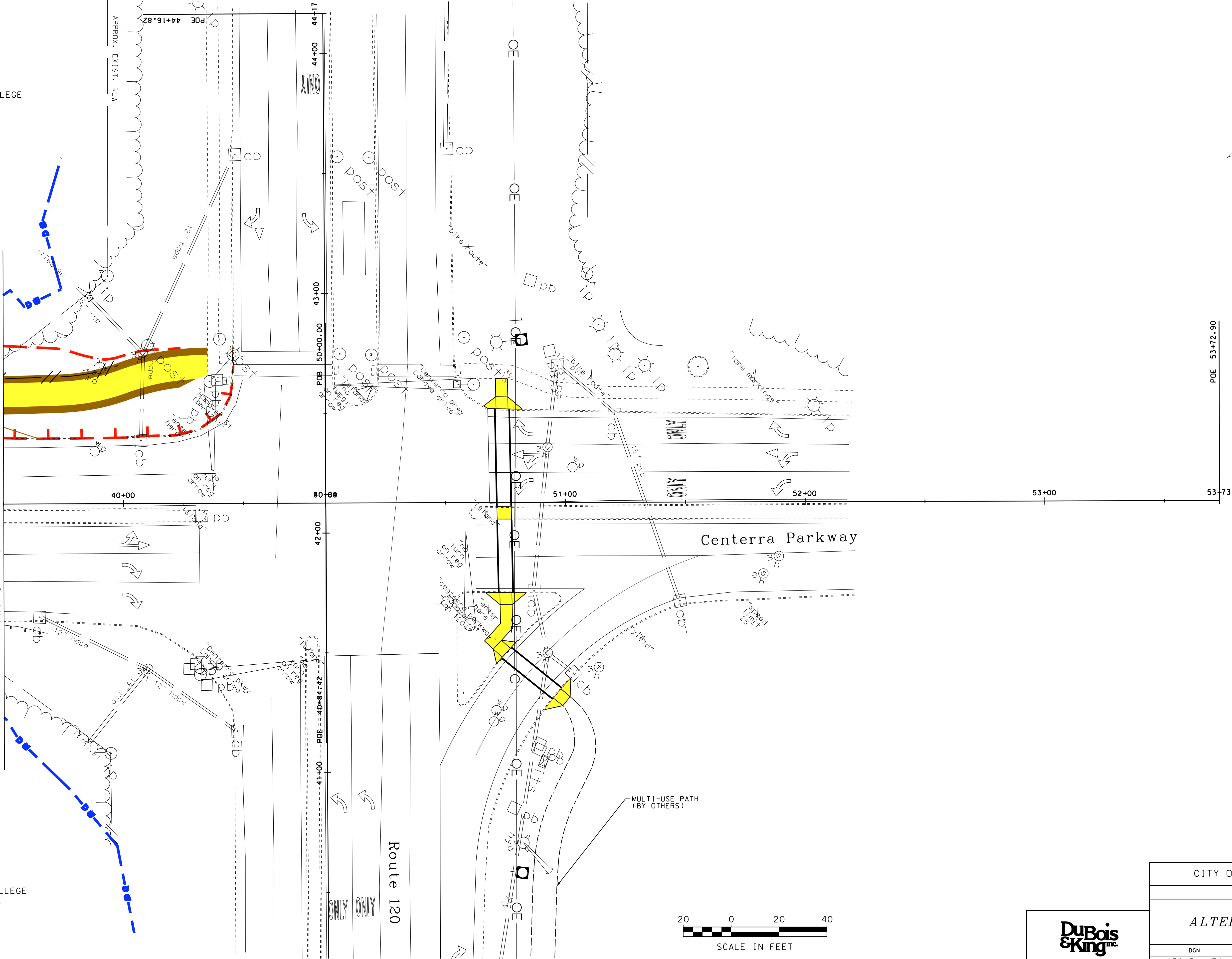


CITY OF LEBANON, NEW HAMPSHIRE			
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DARTMOUTH COLLEGE
TRUSTEES
10-24-2

DARTMOUTH COLLEGE
TRUSTEES
10-24-1

MATCH TO GENERAL PLAN 02



CITY OF LEBANON, NEW HAMPSHIRE

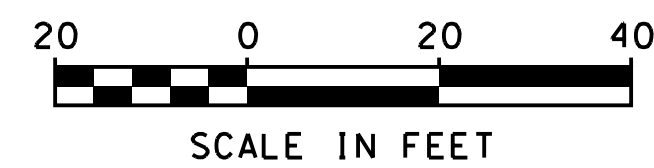
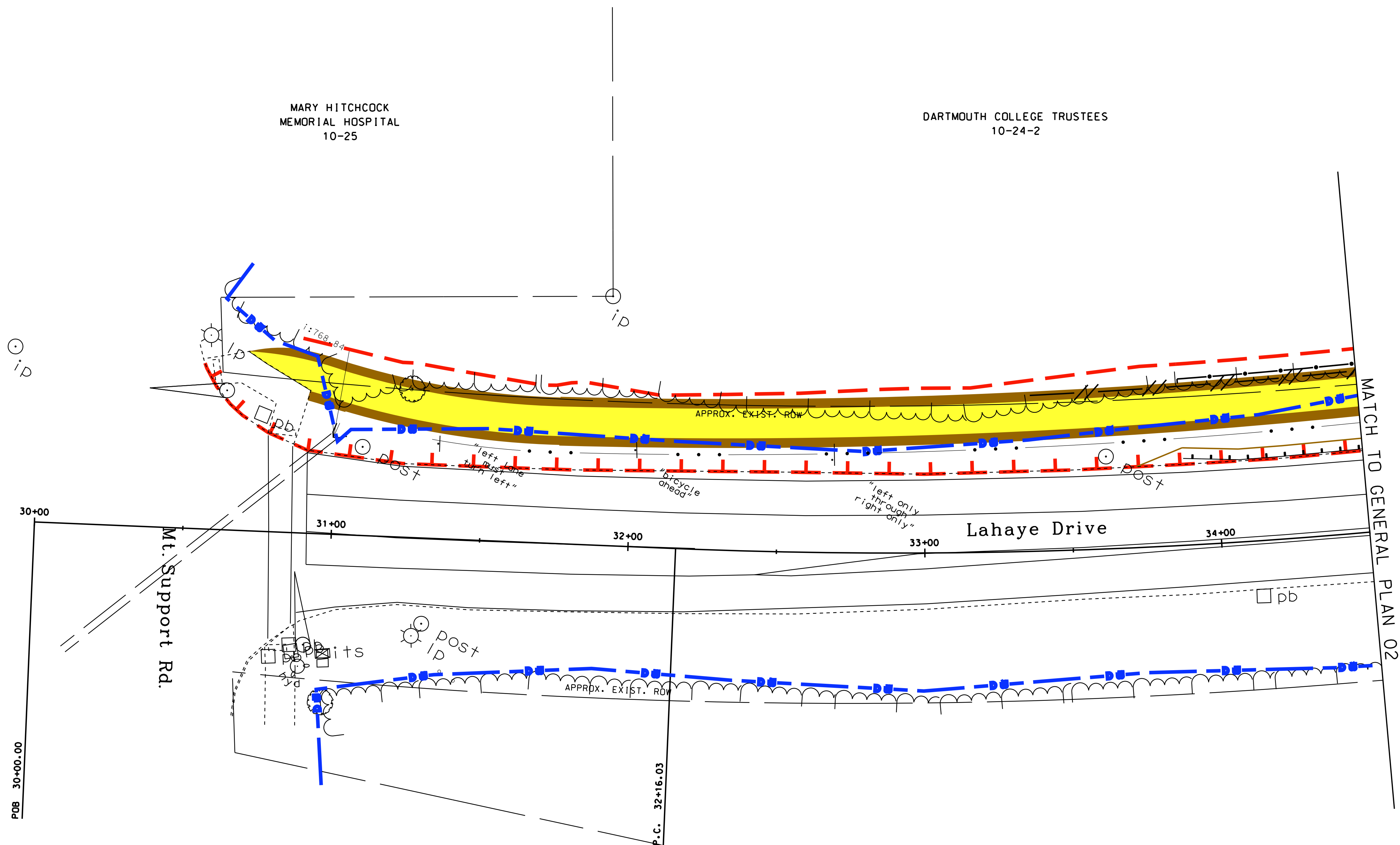
ALTERNATIVE 2, PLAN 03

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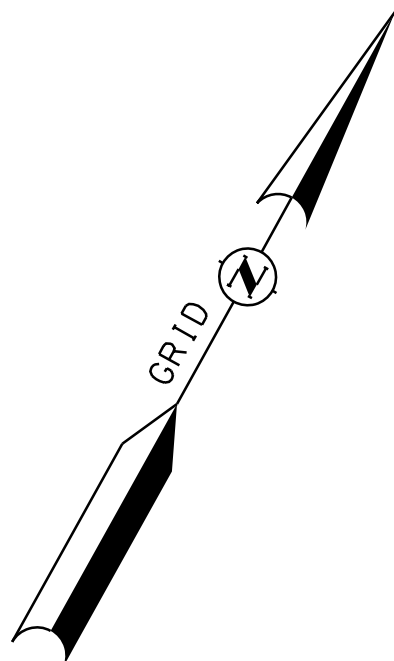
DuBois
& King
INC.

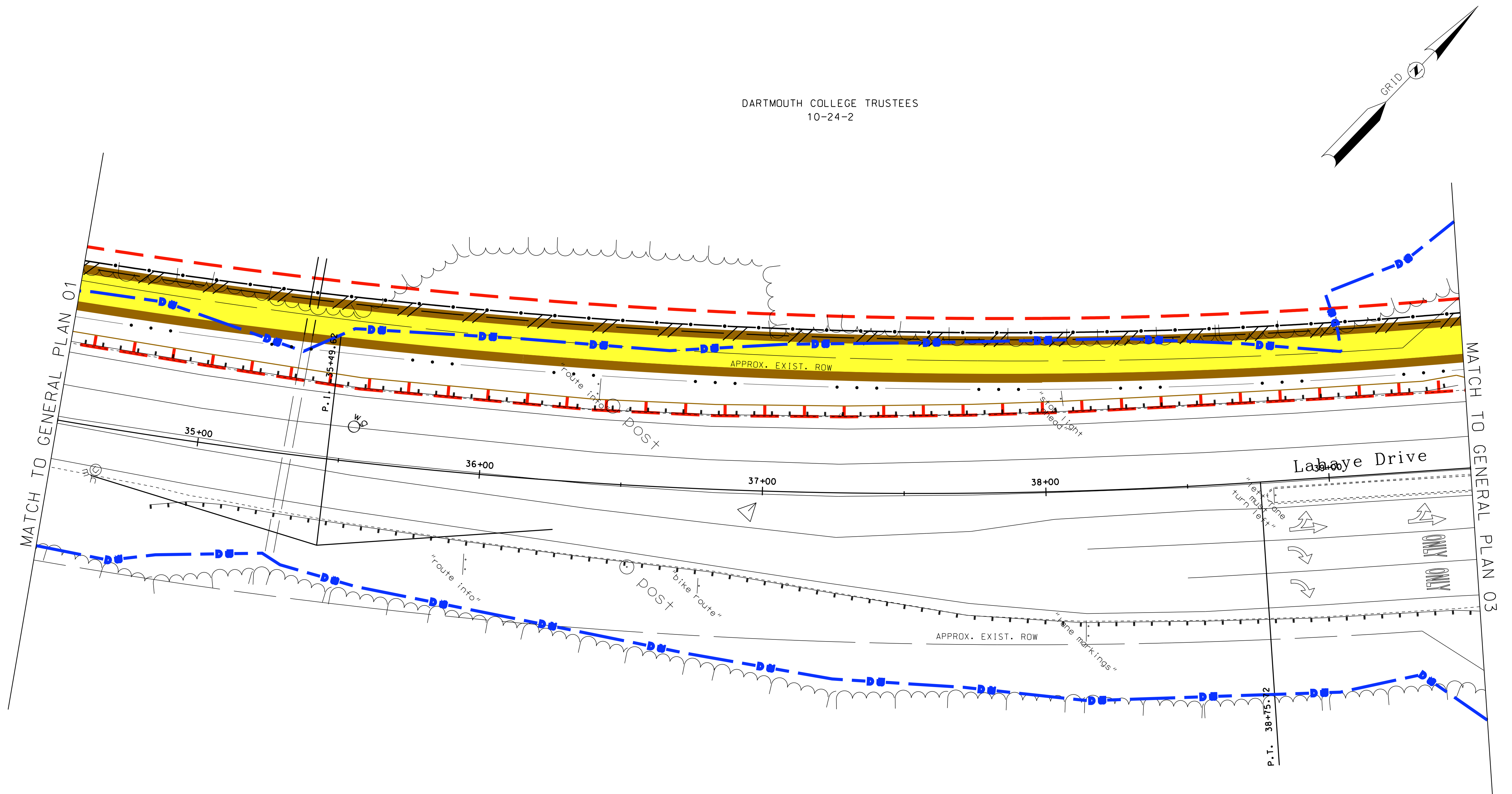
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SCALE IN FEET

SDR PROCESSED	DATE	REVISIONS AFTER PROPOSAL			
NEW DESIGN	DATE	NUMBER	DATE	STATION	DESCRIPTION
SHEET CHECKED	DATE				
AS BUILT DETAILS	DATE				

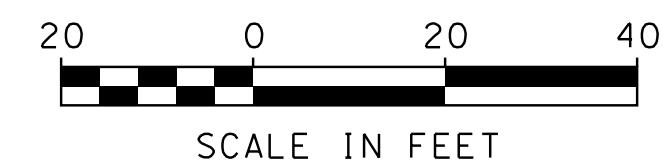


CITY OF LEBANON, NEW HAMPSHIRE			
ALTERNATIVE 2A, PLAN 01			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
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[illegible]

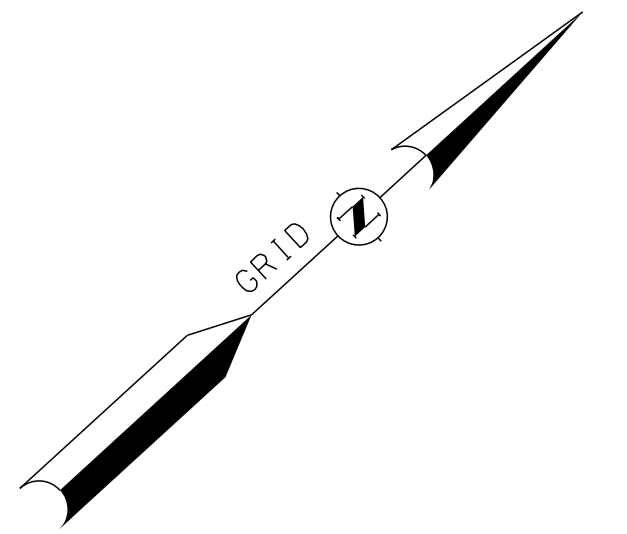
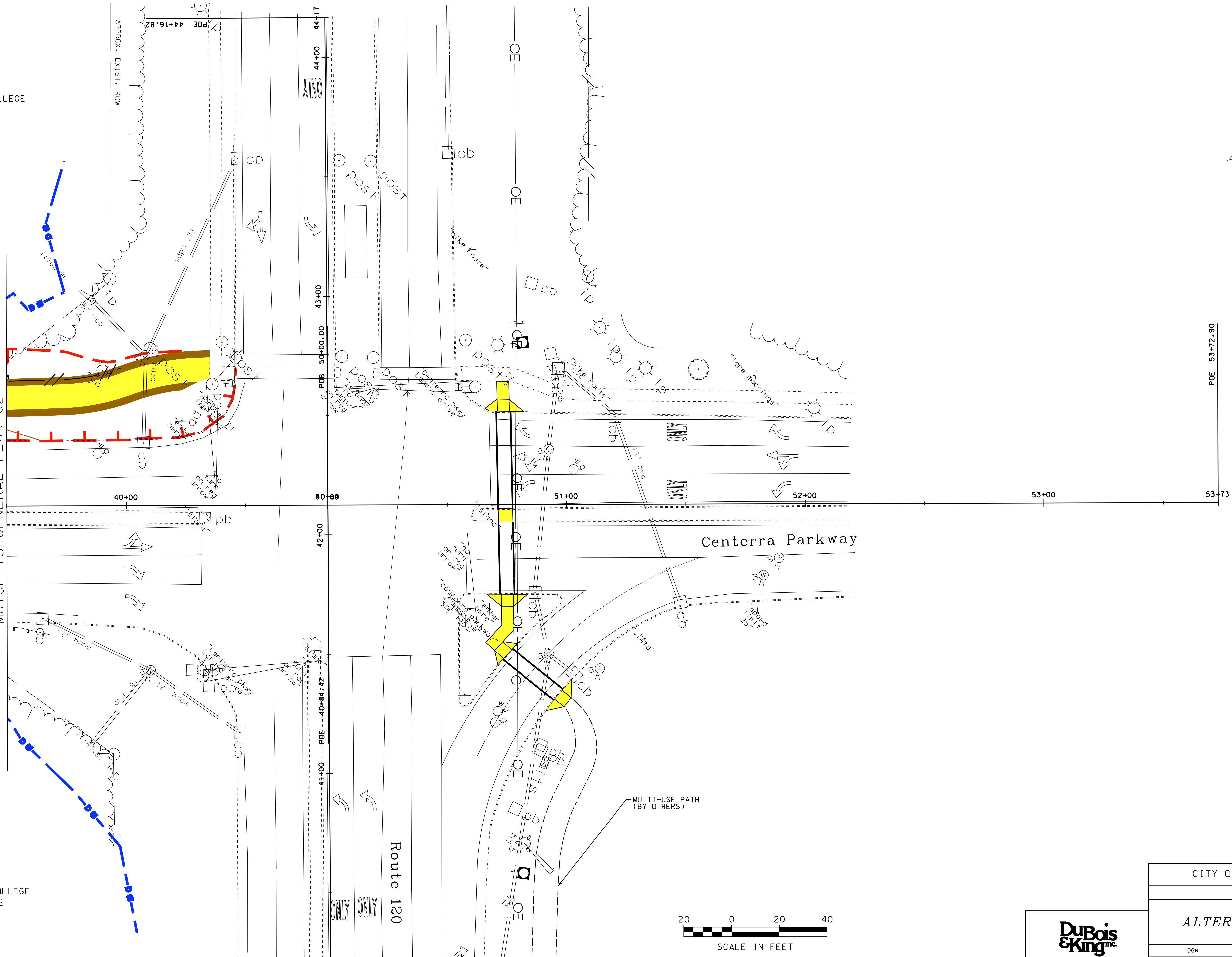
DARTMOUTH COLLEGE TRUSTEES
10-24-1



CITY OF LEBANON, NEW HAMPSHIRE			
<i>ALTERNATIVE 2A, PLAN 02</i>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

DARTMOUTH COLLEGE
TRUSTEES
10-24-1

MATCH TO GENERAL PLAN 02



ALTERNATIVE 2A, PLAN 03

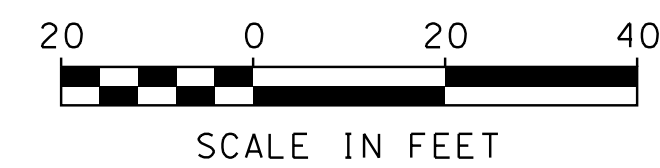
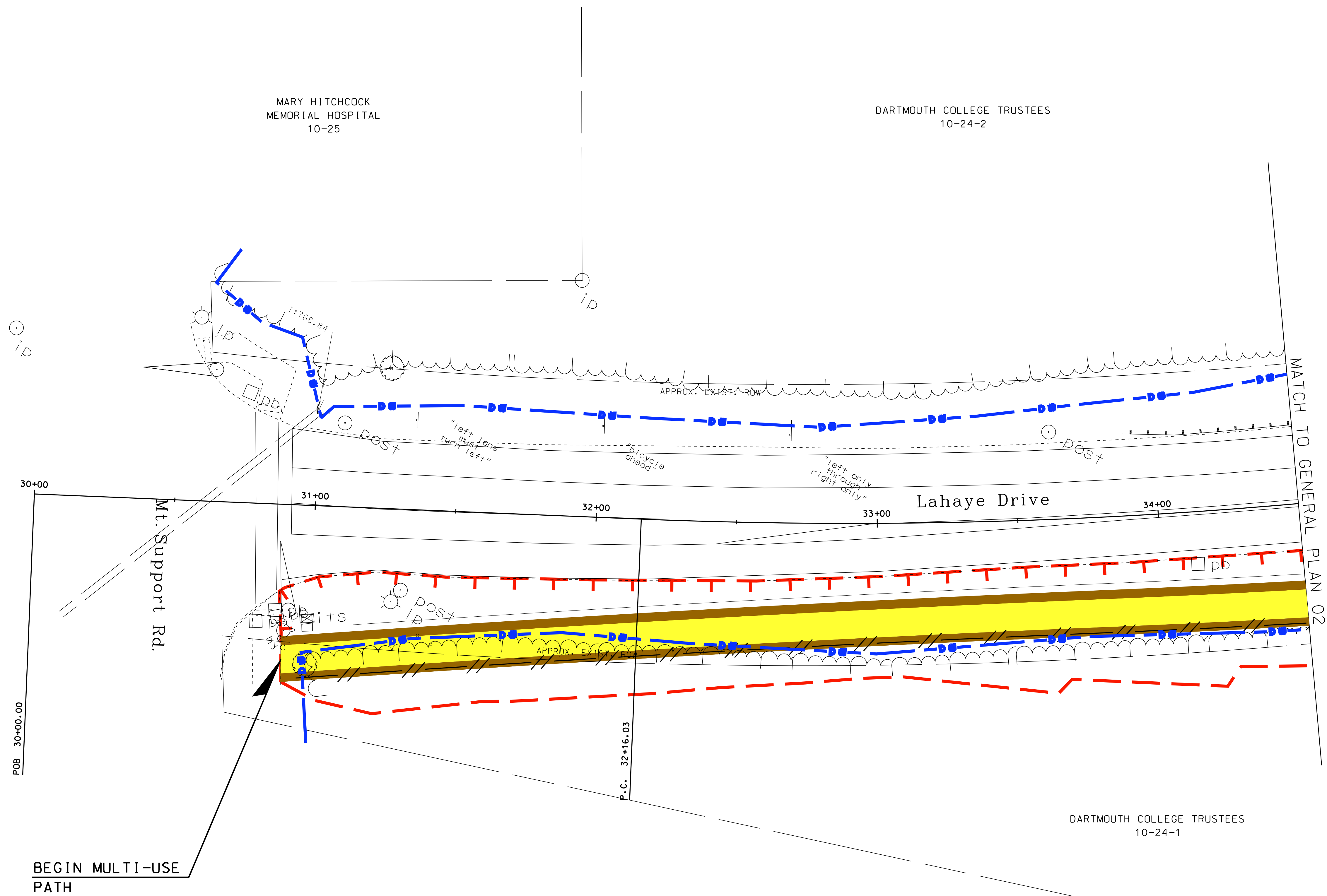
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	



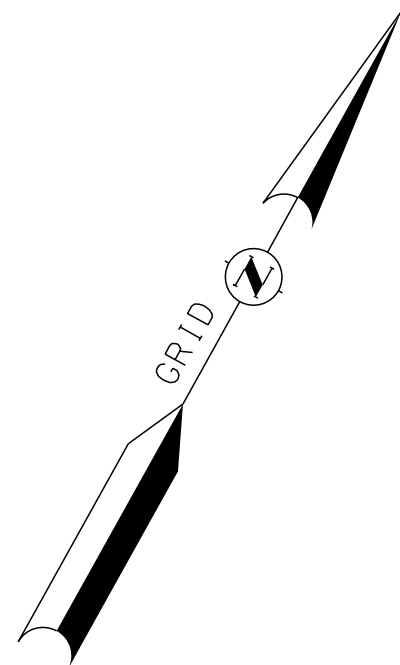
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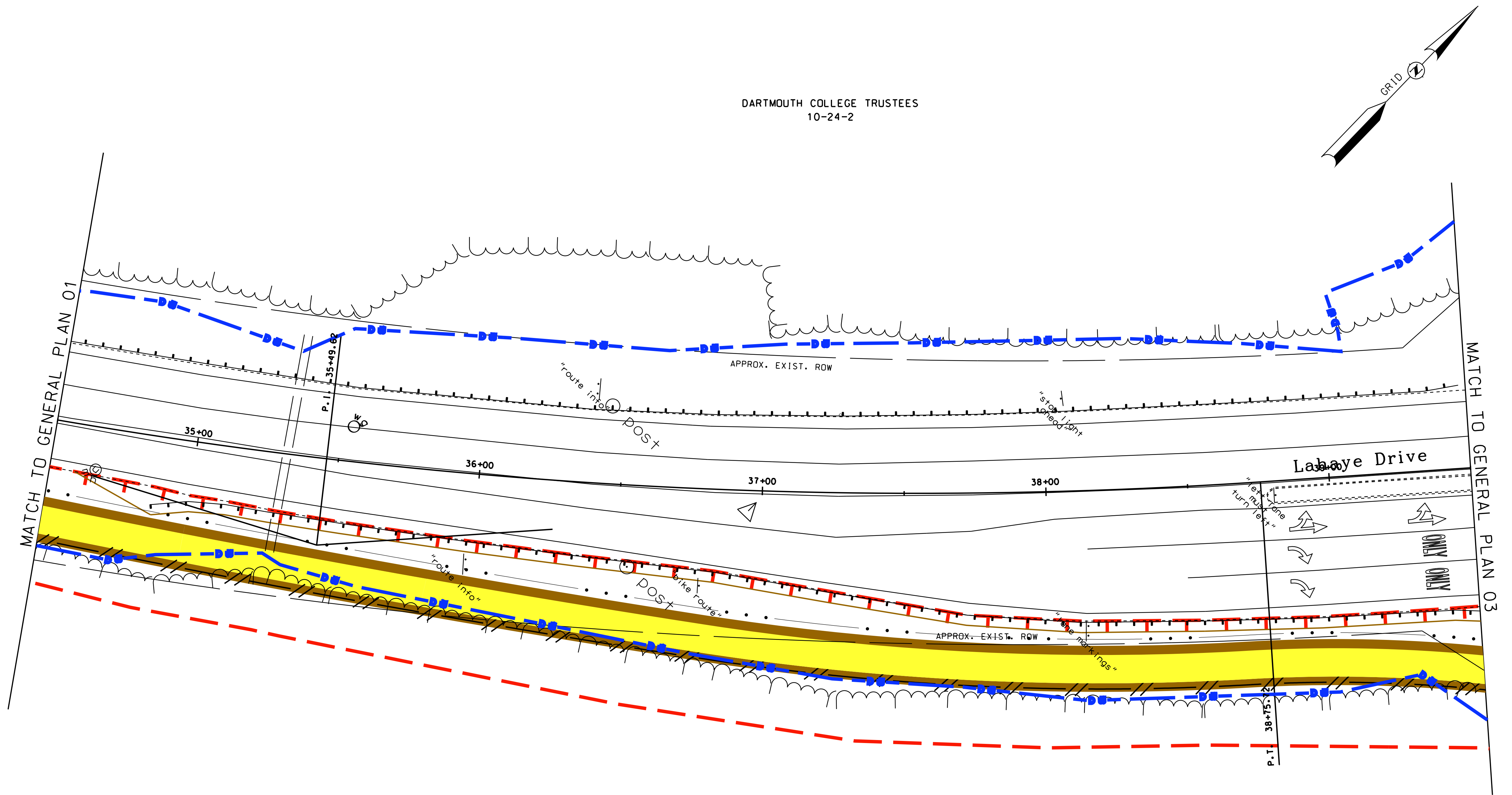
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	SDR PROCESSED	DATE	NUMBER	DATE	STATION	STATION	DESCRIPTION	
	NEW DESIGN	DATE						
	SHEET CHECKED	DATE						
	AS BUILT DETAILS	DATE						



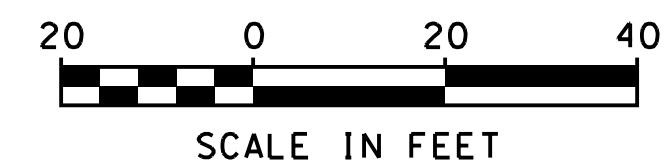
CITY OF LEBANON, NEW HAMPSHIRE			
ALTERNATIVE 3, PLAN 01			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	



SDR PROCESSED		DATE	REVISIONS AFTER PROPOSAL			
NEW DESIGN		DATE	NUMBER	DATE	STATION	DESCRIPTION
SHEET CHECKED		DATE				
AS BUILT DETAILS		DATE				



DARTMOUTH COLLEGE TRUSTEES
10-24-1

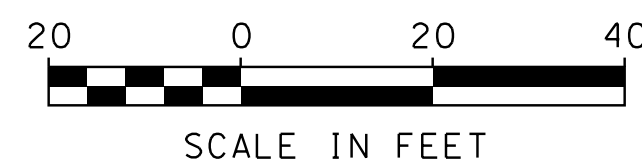
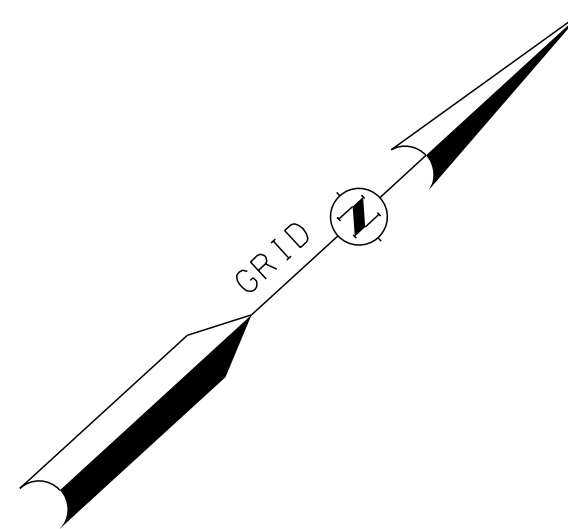
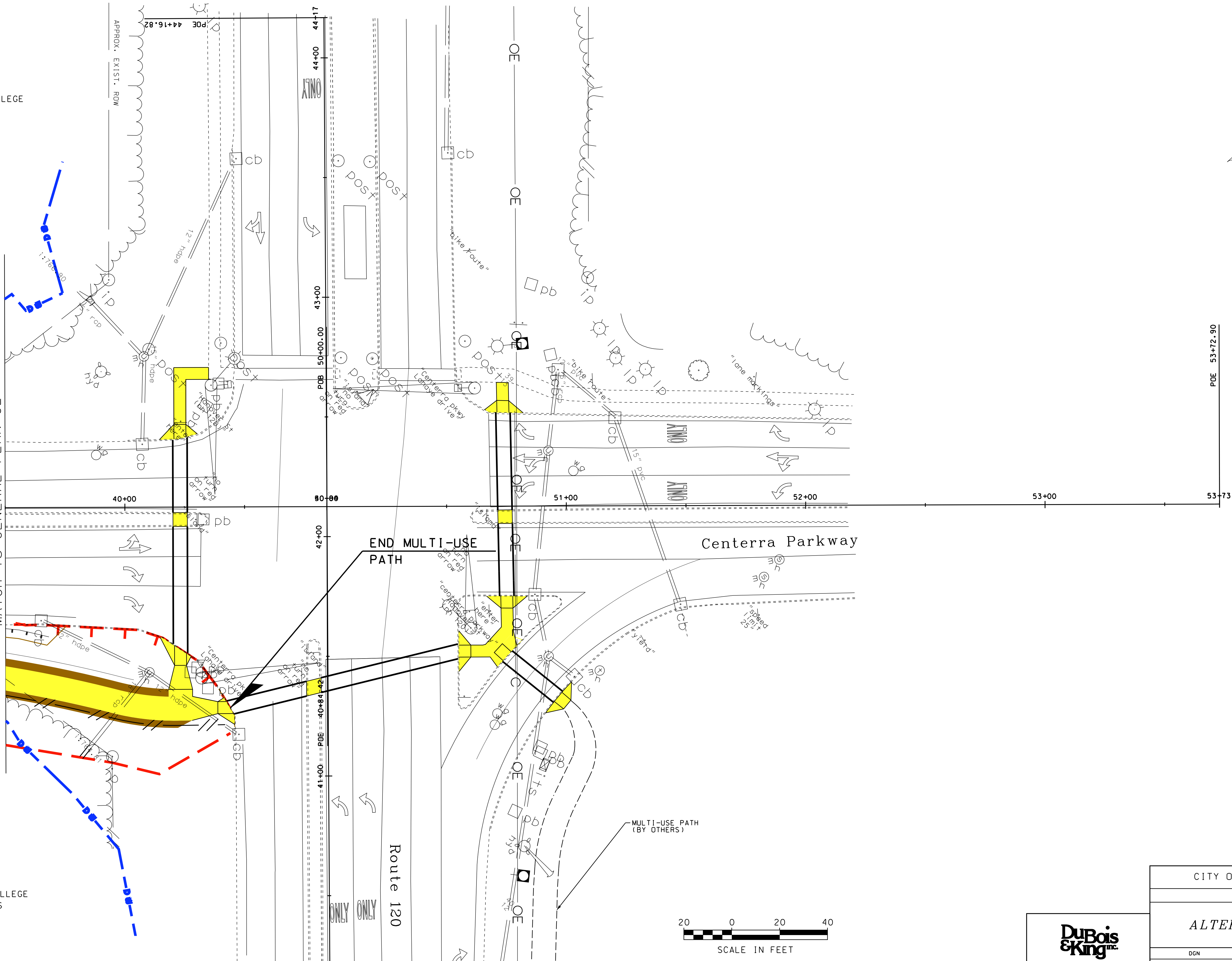


CITY OF LEBANON, NEW HAMPSHIRE			
<p style="text-align: center;"><i>ALTERNATIVE 3, PLAN 02</i></p>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

DARTMOUTH COLLEGE
TRUSTEES
10-24-2

DARTMOUTH COLLEGE
TRUSTEES
10-24-1

MATCH TO GENERAL PLAN 02



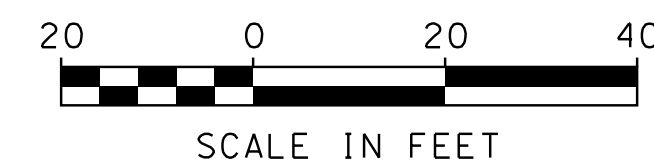
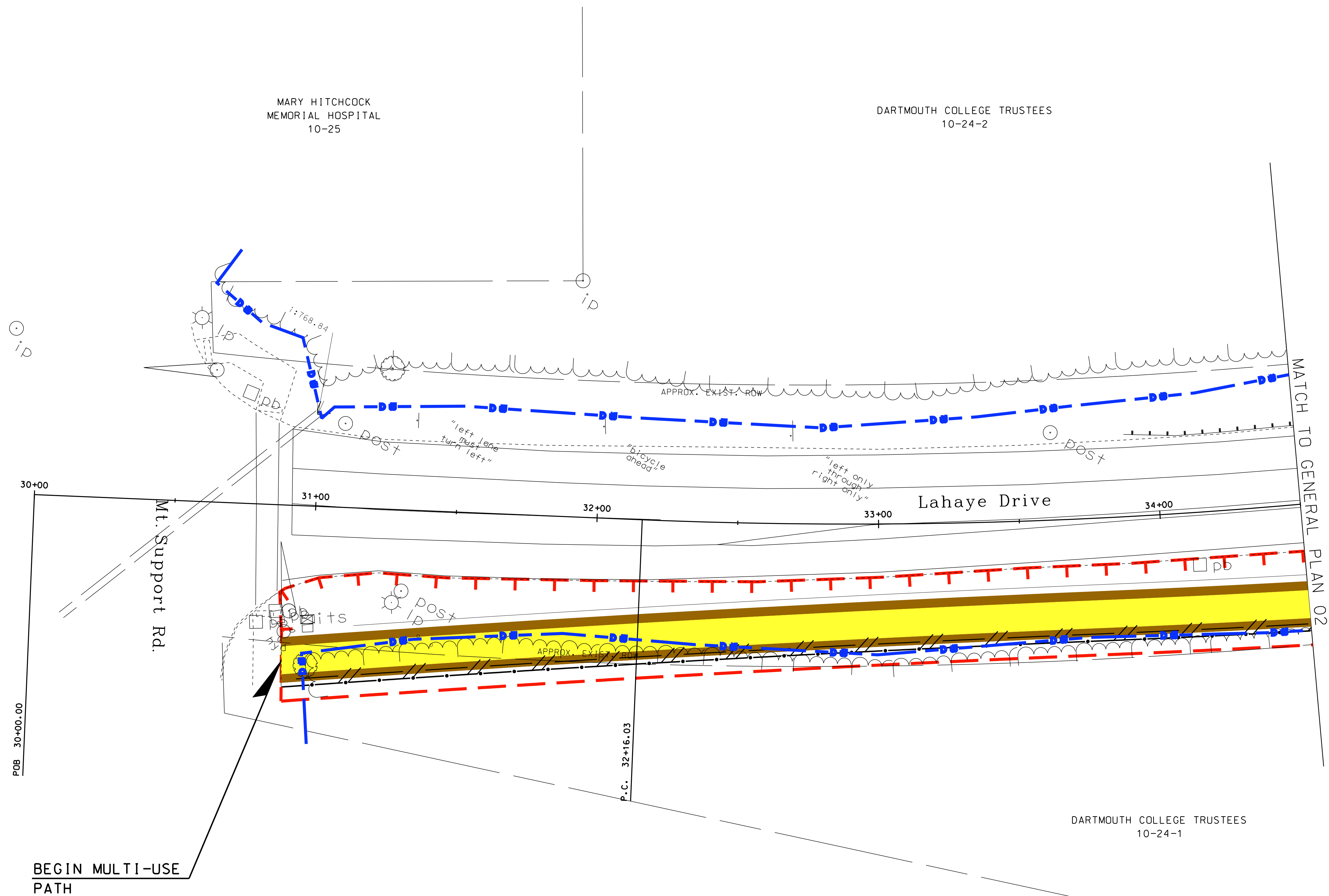
**DuBois
& King**^{INC.}

CITY OF LEBANON, NEW HAMPSHIRE

ALTERNATIVE 3, PLAN 03

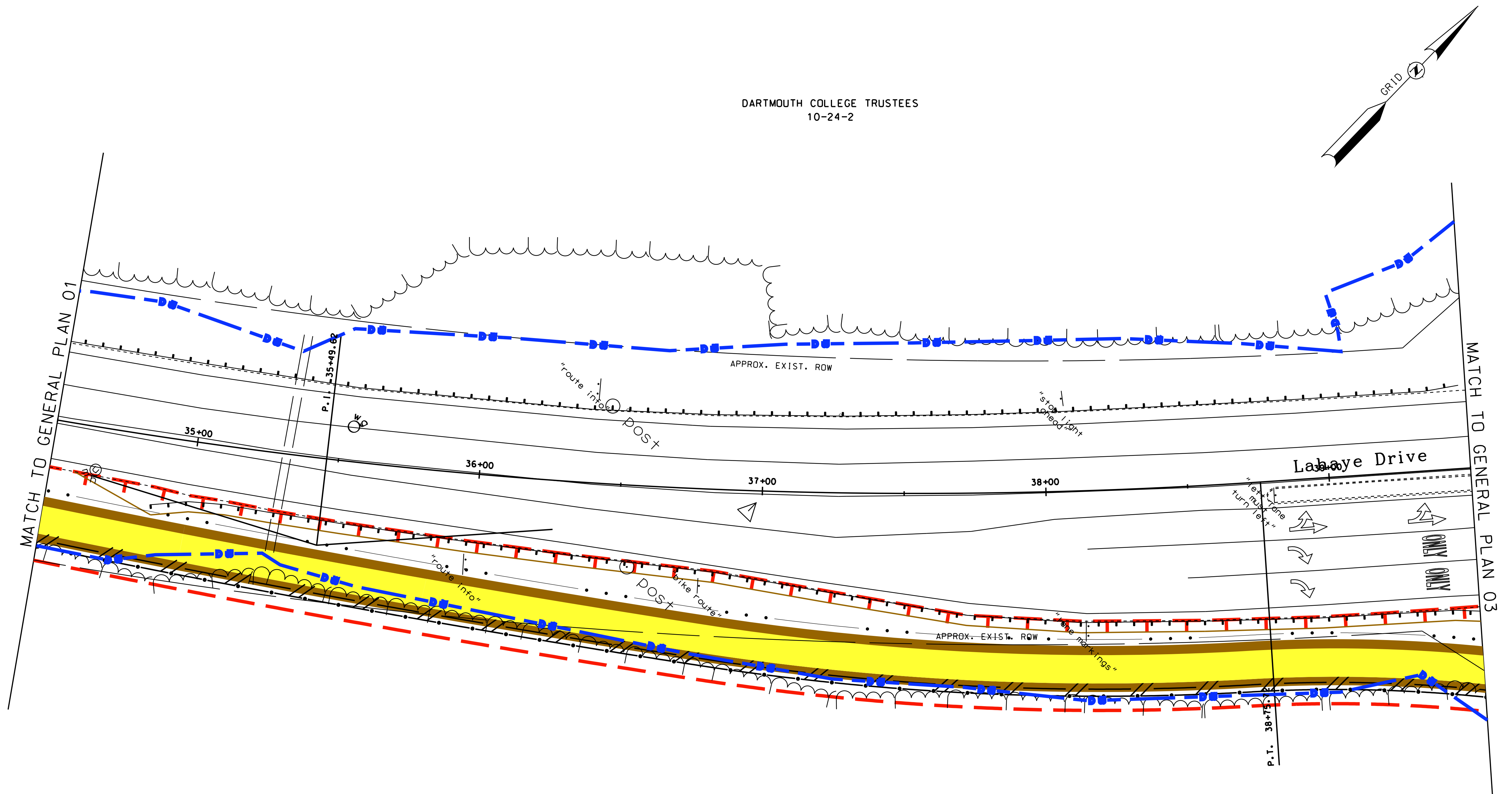
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

REVISIONS AFTER PROPOSAL					
	NUMBER	DATE	STATION	STATION	DESCRIPTION
SDR PROCESSED		DATE			
NEW DESIGN		DATE			
SHEET CHECKED		DATE			
AS BUILT DETAILS		DATE			

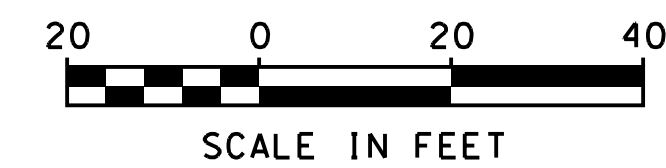


CITY OF LEBANON, NEW HAMPSHIRE			
<i>ALTERNATIVE 3A, PLAN 01</i>			
DCN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

SDR PROCESSED		DATE	REVISIONS AFTER PROPOSAL			
NEW DESIGN		DATE	NUMBER	DATE	STATION	DESCRIPTION
SHEET CHECKED		DATE				
AS BUILT DETAILS		DATE				



DARTMOUTH COLLEGE TRUSTEES
10-24-1

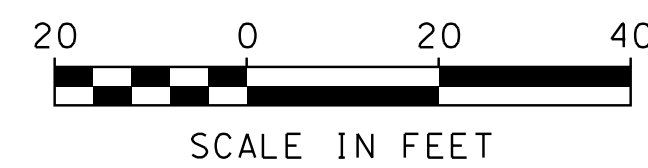
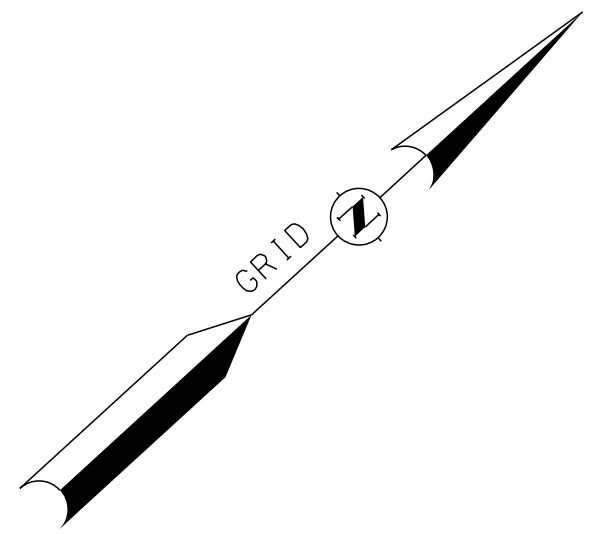
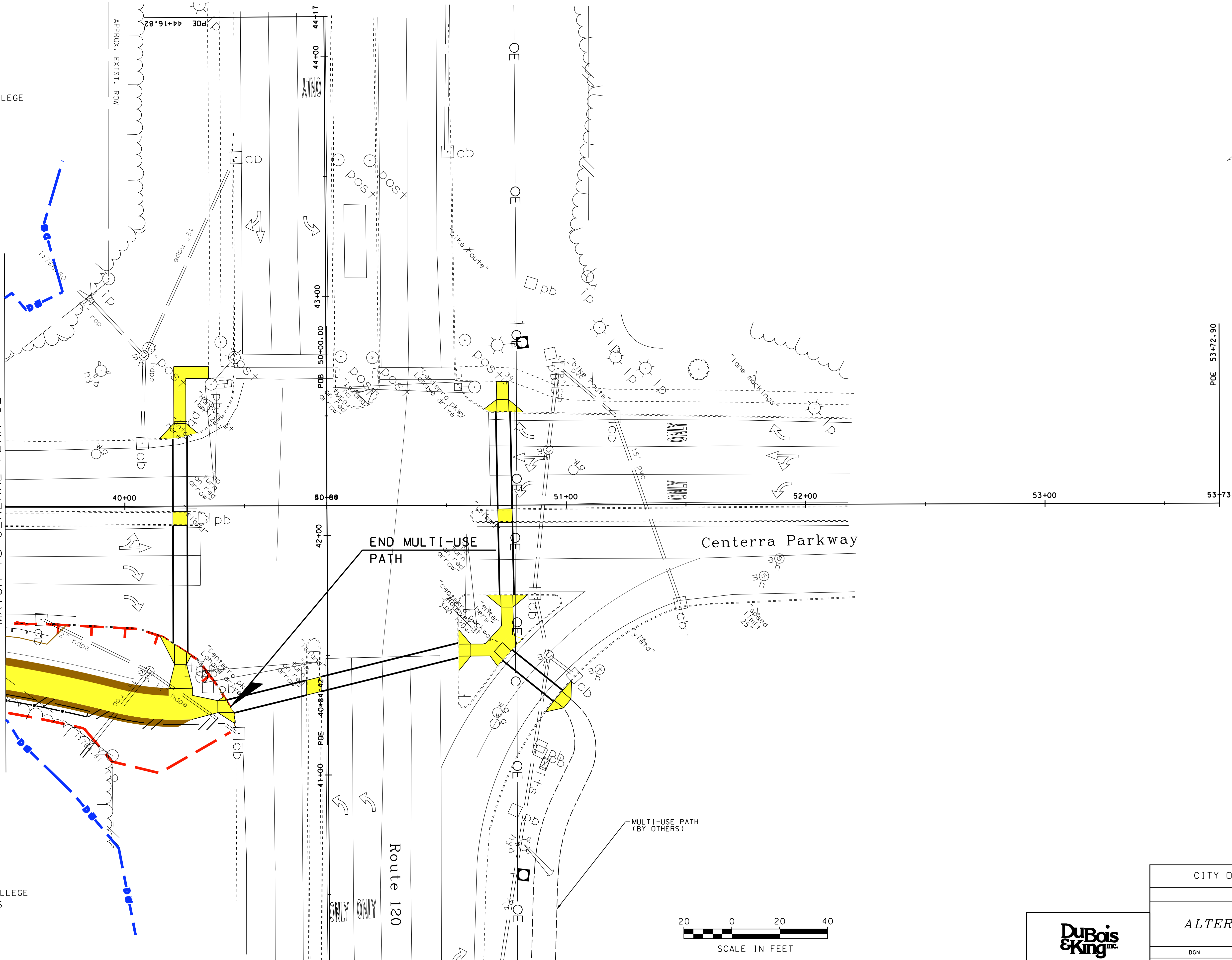


CITY OF LEBANON, NEW HAMPSHIRE			
<p align="center"><i>ALTERNATIVE 3A, PLAN 02</i></p>			
DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

DARTMOUTH COLLEGE
TRUSTEES
10-24-2

DARTMOUTH COLLEGE
TRUSTEES
10-24-1

MATCH TO GENERAL PLAN 02



**DuBois
& King**^{INC.}

CITY OF LEBANON, NEW HAMPSHIRE

ALTERNATIVE 3A, PLAN 03

DGN	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
\$FILENAME\$	\$STNO\$	X	

APPENDIX D

ENGINEER'S OPINION OF
PROBABLE CONSTRUCTION COST

Lebanon-Lahaye Drive Alternatives Matrix

	Purpose & Need		Environmental		w/o Mit.	w/ Mit.
Alternative	Improve Safety	Improve Connectivity	Wetland Impacts	Clearing	Construction Cost	Construction Cost
Alternative 1-No Build	No	No			\$0	\$0
Alternative 2-North Path (Earth Slope)	Yes	Yes	17,500 SF	0.3 A	\$400,000	\$480,000
Alternative 2A-North Path (Retaining Wall)	Yes	Yes	14,600 SF	0.3 A	\$680,000	\$740,000
Alternative 3-South Path (Earth Slope)	Yes	Yes	16,700 SF	0.5 A	\$455,000	\$525,000
Alternative 3A-South Path (Retaining Wall)	Yes	Yes	10810 SF	0.3 A	\$794,000	\$844,000



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☐ S. Burlington, VT 05403 (802) 878-7661
☒ Laconia, NH 03246 (603) 524-1166

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PROJECT 624260 - Lahaye Drive

SHEET NO. 1 OF 1

CALCULATED BY: CEB DATE: 05-Jun-18

CHECKED BY: B. BRESLEND DATE: 12-Jun-18

SCALE:

LEBANON, NH: LAHAYE DRIVE ESTIMATE - ALTERNATIVE 2, NORTH - EMBANKMENT

ITEM NO.	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
NHDOT PARTICIPATING ITEMS					
201.1	CLEARING AND GRUBBING (F)	A	0.3	\$20,000.00	\$6,600.00
203.1	COMMON EXCAVATION	CY	80	\$17.00	\$1,360.00
203.2	ROCK EXCAVATION	CY	1	\$80.00	\$80.00
203.6	EMBANKMENT-IN-PLACE	CY	4000	\$23.50	\$94,000.00
206.1	COMMON STRUCTURE EXCAVATION	CY	300	\$50.00	\$15,000.00
209.1	GRANULAR BACKFILL	CY	280	\$50.00	\$14,000.00
304.3	CRUSHED GRAVEL (F)	CY	190	\$32.50	\$6,175.00
304.32	CRUSHED GRAVEL FOR SHOULDER LEVELING	CY	90	\$40.00	\$3,600.00
603.00230	30" R.C. PIPE, 200D	LF	40	\$50.00	\$2,000.00
603.11236	36" CORR. STEEL PIPE, .079"	LF	30	\$60.00	\$1,800.00
603.82218	18" PE PIPE (TYPE S)	LF	600	\$50.00	\$30,000.00
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	EA	3	\$3,000.00	\$9,000.00
607.250	CHAIN LINK FENCE WITH ALUMINUM COATED STEEL FABRIC, 5' HIGH	LF	650	\$25.00	\$16,250.00
608.12	2" BITUMINOUS SIDEWALK (F)	SY	1100	\$20.00	\$22,000.00
608.441	CONCRETE SIDEWALK TIP-DOWNS	SY	50	\$50.00	\$2,500.00
609.01	STRAIGHT GRANITE CURB	LF	110	\$30.00	\$3,300.00
609.21	STRAIGHT GRANITE SLOPE CURB	LF	50	\$30.00	\$1,500.00
616.191	ALTERATIONS TO TRAFFIC SIGNALS	U	1	\$20,000.00	\$20,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$20,000.00	\$20,000.00
645.111	MULCH	SY	2270	\$1.00	\$2,270.00
645.531	SILT FENCE	LF	950	\$3.00	\$2,850.00
645.7	STORM WATER POLLUTION PREVENTION PLAN	U	1	\$3,000.00	\$3,000.00
645.71	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	HR	70	\$70.00	\$4,900.00
646.31	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS	SY	2270	\$3.15	\$7,150.50
647.1	HUMUS	CY	190	\$24.00	\$4,560.00
692	MOBILIZATION	U	1	\$25,000.00	\$25,000.00
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	3000	\$1.00	\$3,000.00
NHDOT PARTICIPATING SUBTOTAL					\$318,895.50
25% +/- Contingency					\$79,723.88
Total Budget for Project					\$399,000.00

Note:

In providing opinions of probable construction cost, the Client understands that D&K has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. D&K makes no warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from the Opinion of Probable Construction Cost provided herein.



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☐ Bedford, NH 03110 (603) 637-1043
☐ S. Burlington, VT 05403 (802) 878-7661
☒ Laconia, NH 03246 (603) 524-1166

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PROJECT 624260 - Lahaye Drive

SHEET NO. 1 OF 1

CALCULATED BY: CEB DATE: 05-Jun-18

CHECKED BY: B. BRESLEND DATE: 13-Jun-18

SCALE: _____

LEBANON, NH: LAHAYE DRIVE ESTIMATE - ALTERNATIVE 2, NORTH - WALL

ITEM NO.	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
NHDOT PARTICIPATING ITEMS					
201.1	CLEARING AND GRUBBING (F)	A	0.30	\$20,000.00	\$6,000.00
203.1	COMMON EXCAVATION	CY	80	\$17.00	\$1,360.00
203.2	ROCK EXCAVATION	CY	1	\$80.00	\$80.00
203.6	EMBANKMENT-IN-PLACE	CY	2820	\$23.50	\$66,270.00
206.1	COMMON STRUCTURE EXCAVATION	CY	300	\$50.00	\$15,000.00
209.1	GRANULAR BACKFILL	CY	280	\$50.00	\$14,000.00
304.3	CRUSHED GRAVEL (F)	CY	190	\$32.50	\$6,175.00
304.32	CRUSHED GRAVEL FOR SHOULDER LEVELING	CY	90	\$40.00	\$3,600.00
592.5	MODULAR BLOCK RETAINING WALL	SF	3800	\$66.00	\$250,800.00
603.00230	30" R.C. PIPE, 200D	LF	40	\$50.00	\$2,000.00
603.11236	36" CORR. STEEL PIPE, .079"	LF	30	\$60.00	\$1,800.00
603.82218	18" PE PIPE (TYPE S)	LF	600	\$50.00	\$30,000.00
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	EA	3	\$3,000.00	\$9,000.00
607.250	CHAIN LINK FENCE WITH ALUMINUM COATED STEEL FABRIC, 5' HIGH	LF	650	\$25.00	\$16,250.00
608.12	2" BITUMINOUS SIDEWALK (F)	SY	1100	\$20.00	\$22,000.00
608.441	CONCRETE SIDEWALK TIP-DOWNS	SY	50	\$50.00	\$2,500.00
609.01	STRAIGHT GRANITE CURB	LF	110	\$30.00	\$3,300.00
609.21	STRAIGHT GRANITE SLOPE CURB	LF	50	\$30.00	\$1,500.00
616.191	ALTERATIONS OF TRAFFIC SIGNALS	U	1	\$20,000.00	\$20,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$20,000.00	\$20,000.00
645.111	MULCH	SY	1340	\$1.00	\$1,340.00
645.531	SILT FENCE	LF	950	\$3.00	\$2,850.00
645.7	STORM WATER POLLUTION PREVENTION PLAN	U	1	\$3,000.00	\$3,000.00
645.71	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	HR	70	\$70.00	\$4,900.00
646.31	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS	SY	1340	\$2.90	\$3,886.00
647.1	HUMUS	CY	150	\$24.00	\$3,600.00
692	MOBILIZATION	U	1	\$30,000.00	\$30,000.00
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	3000	\$1.00	\$3,000.00
NHDOT PARTICIPATING SUBTOTAL				\$541,211.00	
25% +/- Contingency				\$135,302.75	
Total Budget for Project				\$677,000.00	

Note:

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☒ Laconia, NH 03246 (603) 524-1166

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PROJECT 624260 - Lahaye Drive

SHEET NO. 1 OF 1

CALCULATED BY: CEB DATE: 05-Jun-18

CHECKED BY: B. BRESLEND DATE: 13-Jun-18

SCALE:

LEBANON, NH: LAHAYE DRIVE ESTIMATE - ALTERNATIVE 3, SOUTH - EMBANKMENT

ITEM NO.	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
NHDOT PARTICIPATING ITEMS					
201.1	CLEARING AND GRUBBING (F)	A	0.5	\$20,000.00	\$10,000.00
203.1	COMMON EXCAVATION	O	100	\$17.00	\$1,700.00
203.2	ROCK EXCAVATION	CY	1	\$80.00	\$80.00
203.6	EMBANKMENT-IN-PLACE	CY	4130	\$23.50	\$97,055.00
206.1	COMMON STRUCTURE EXCAVATION	CY	290	\$50.00	\$14,500.00
209.1	GRANULAR BACKFILL	CY	280	\$50.00	\$14,000.00
304.3	CRUSHED GRAVEL (F)	CY	190	\$32.50	\$6,175.00
304.32	CRUSHED GRAVEL FOR SHOULDER LEVELING	CY	110	\$40.00	\$4,400.00
603.11236	36" CORR. STEEL PIPE, .079"	LF	30	\$60.00	\$1,800.00
603.82218	18" PE PIPE (TYPE S)	LF	600	\$50.00	\$30,000.00
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	EA	3	\$3,000.00	\$9,000.00
607.250	CHAIN LINK FENCE WITH ALUMINUM COATED STEEL FABRIC, 5' HIGH	LF	970	\$25.00	\$24,250.00
608.12	2" BITUMINOUS SIDEWALK (F)	SY	1100	\$20.00	\$22,000.00
608.441	CONCRETE SIDEWALK TIP-DOWNS	SY	100	\$50.00	\$5,000.00
609.01	STRAIGHT GRANITE CURB	LF	60	\$30.00	\$1,800.00
609.21	STRAIGHT GRANITE SLOPE CURB	LF	80	\$30.00	\$2,400.00
616.191	ALTERATIONS TO TRAFFIC SIGNALS	U	1	\$40,000.00	\$40,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$25,000.00	\$25,000.00
645.111	MULCH	SY	2860.0	\$1.06	\$3,031.60
645.531	SILT FENCE	LF	950.0	\$3.00	\$2,850.00
645.7	STORM WATER POLLUTION PREVENTION PLAN	U	1	\$3,000.00	\$3,000.00
645.711	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	HR	70	\$70.00	\$4,900.00
646.31	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS	SY	2860	\$2.00	\$5,720.00
647.1	HUMUS	CY	320	\$24.00	\$7,680.00
692	MOBILIZATION	U	1	\$25,000.00	\$25,000.00
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	3000	\$1.00	\$3,000.00
SUBTOTAL				\$364,341.60	
25% +/- Contingency				\$91,085.40	
Total Budget for Project				\$455,000.00	

Note:

In providing opinions of probable construction cost, the Client understands that D&K has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. D&K makes no warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from the Opinion of Probable Construction Cost provided herein.



☐ Randolph, VT 05060 (802) 728-3376
☐ Bedford, NH 03110 (603) 637-1043
☐ S. Burlington, VT 05403 (802) 878-7661
☒ Laconia, NH 03246 (603) 524-1166

Engineering • Planning • Development • Management

PROJECT 624260 - Lahaye Drive

SHEET NO. 1 OF 1

CALCULATED BY: CEB DATE: 05-Jun-18

CHECKED BY: B. BRESLEND DATE: 13-Jun-18

SCALE:

LEBANON, NH: LAHAYE DRIVE ESTIMATE - ALTERNATIVE 3, SOUTH - WALL

ITEM NO.	DESCRIPTION	UNIT	QUANT.	UNIT PRICE	AMOUNT
NHDOT PARTICIPATING ITEMS					
201.1	CLEARING AND GRUBBING (F)	A	0.40	\$20,000.00	\$8,000.00
203.1	COMMON EXCAVATION	CY	100	\$17.00	\$1,700.00
203.2	ROCK EXCAVATION	CY	1	\$80.00	\$80.00
203.6	EMBANKMENT-IN-PLACE	CY	2720	\$23.50	\$63,920.00
206.1	COMMON STRUCTURE EXCAVATION	CY	290	\$50.00	\$14,500.00
209.1	GRANULAR BACKFILL	CY	280	\$50.00	\$14,000.00
304.3	CRUSHED GRAVEL (F)	CY	190	\$32.50	\$6,175.00
304.32	CRUSHED GRAVEL FOR SHOULDER WIDENING	CY	110	\$40.00	\$4,400.00
592.5	MODULAR BLOCK RETAINING WALL	SF	5310	\$60.00	\$318,600.00
603.11236	36" CORR. STEEL PIPE, .079"	LF	30	\$60.00	\$1,800.00
603.82218	18" PE PIPE (TYPE S)	LF	600	\$50.00	\$30,000.00
604.124	CATCH BASINS TYPE B, 4-FOOT DIAMETER	EA	3	\$3,000.00	\$9,000.00
607.250	CHAIN LINK FENCE WITH ALUMINUM COATED STEEL FABRIC, 5' HIGH	LF	970	\$25.00	\$24,250.00
608.12	2" BITUMINOUS SIDEWALK (F)	SY	1090	\$20.00	\$21,800.00
608.441	CONCRETE SIDEWALK TIP-DOWNS	SY	100	\$30.00	\$3,000.00
609.01	STRAIGHT GRANITE CURB	LF	60	\$30.00	\$1,800.00
609.21	STRAIGHT GRANITE SLOPE CURB	LF	80	\$50.00	\$4,000.00
616.191	ALTERATIONS OF TRAFFIC SIGNALS	U	1	\$35,000.00	\$35,000.00
619.1	MAINTENANCE OF TRAFFIC	U	1	\$20,000.00	\$20,000.00
645.111	MULCH	SY	1770	\$1.00	\$1,770.00
645.531	SILT FENCE	LF	950	\$3.00	\$2,850.00
645.7	STORM WATER POLLUTION PREVENTION PLAN	U	1	\$3,000.00	\$3,000.00
645.711	MONITORING SWPPP AND EROSION AND SEDIMENT CONTROLS	HR	70	\$70.00	\$4,900.00
646.31	TURF ESTABLISHMENT WITH MULCH AND TACKIFIERS	SY	1770	\$2.75	\$4,867.50
647.1	HUMUS	CY	200	\$24.00	\$4,800.00
692	MOBILIZATION	U	1	\$31,000.00	\$31,000.00
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	3000	\$1.00	\$3,000.00
NHDOT PARTICIPATING SUBTOTAL					\$635,212.50
25% +/- Contingency					\$158,803.13
Total Budget for Project					\$794,000.00

Note:

In providing opinions of probable construction cost, the Client understands that D&K has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. D&K makes no warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

APPENDIX E

MEETING MINUTES



Project: TAP Lahaye Drive Multi-Use Path Date
Federal #: X-A004 (617)
NHDOT #: 41366
Dubois & King #: 624260

Issued: 5-23-2018
Meeting Date: 4-10-2018
Location: Lebanon City Hall
Time: 1:30 PM

Project Kick-Off Meeting Minutes

Regarding: NHDOT Transportation Alternatives Program (TAP), Lebanon NH –
Engineering Study & Pre-design conference (kick-off meeting)

Attended By: (See Attached Sign-In Sheet)

Attachments: Meeting Agenda, Sign-In Sheet

Prepared By: Rebecca Owens, Associate Planner, Lebanon, NH

MEETING NOTES

Rebecca Owens from the City of Lebanon Planning & Zoning Department organized the meeting. Darren Benoit, the Project Manager for the project consultant, Dubois & King, facilitated attendee introductions, noted the meeting agenda topics, and provided an overview of the project. Mr. Benoit's team included Matthew Bradley, Project Engineer.

Natural Resources

D&K noted the role of species activity, including bats, in study timing.

Survey

D&K completed base map.

ROW

D&K has established line locations and needs abutters list. It is not clear yet whether the City will have an easement for the path; the hope is that the path will be aligned entirely over ROW.

Traffic



D&K does not anticipate any changes in patterns but will be proactive and identify dominant movement to/from proposed path. Will assess if cyclist pattern is to cross Route 120 on road, versus potential for cyclists to cross at the path (crosswalk).

Archaeological Research

D&K started background research and needs to return for site visits.

Design

Steven Cutter asked if there will be a grass median between the path and road. Discussion ensued regarding the significant difference in grade between the road and adjacent area proposed for the path, called a "vertical separation". City DPW representatives noted the need for the path to accommodate plowing and potential issue of road snow removal impacting a) road shoulder usability for on-road cyclists and b) path conditions. At path's intersection with roadways and in general, the maximum sloped allowed is 2:1. There must also be consideration regarding guardrails and if retaining walls or other techniques will be necessary to manage the grade. Mike Lavalla, DPW, asked if path users will be comfortable riding below grade (relative to vehicle traffic at a higher grade on the roadway, Lahaye Drive); there is associated need to factor in dust, rocks, and safety in general, in addition to snow. For example, at Centerra, to minimize safety risks and liability, all of the paths have ample separation of the sidewalk from roads. It was asked if the City could restripe the road if needed to create more separation.

Ms. Owens asked to what degree the path will be linear or if it can meander. D&K indicated that they are open to designs that consider both and that topic can be part of future alternatives analysis and public input.

The City indicated that it will want to be able to mow 3-4 feet on each side of the path and accommodate such equipment.

Ms. Owens asked about night-time visibility for the path. It was discussed among City staff what other paths in the area, including Mt. Support Road path, used for centerline painting and whether it was reflective. Options include reflective delineators, inlaid areas with milled pavement.

Mr. Benoit may recommend replacing the endpoints of the guardrail adjacent to the path.

It was asked if there will be the potential need to upgrade the existing pedestrian crossing from the north side of Lahaye Drive, across Route 120, to Centerra Parkway, but there were no definitive related remarks to note.

Mr. Benoit asked about the City's plans for bike-related wayfinding signage. It was discussed that DHMC is looking into signage. Mr. Benoit recommended his contact at 3M as a potential resource for learning about prioritization of wayfinding needs and appropriate solutions. Mr.



Brooks mentioned that wayfinding is an element that contributes to the City's Bike Friendly Community designation.

There may need to be an ADA stepdown feature for accessibility.

Project Schedule

- There was some discussion on what phases/tasks must be completed in what year and if based on calendar or federal fiscal year; City to follow-up with clarification on dates.
- *May 23, 2018 was scheduled for the public/local concerns meeting date.* There was some discussion on the recommended format for the public/local concerns meeting with respect to how much information and interaction with meeting staff should be available for attendees prior to the official meeting start time. It was decided that the doors would open 1 hour prior to the meeting start time to allow presentation set-up and attendee review of project displays (e.g., aerial map, property boundaries with right-of-way), but that anyone with questions would be asked to hold them for during the meeting and/or to write their question in advance on a comment card.
- *June 6, 2018. was identified as the Meeting Date for Consultant Presentation of Proposed Action, following completion of the Alternatives Analysis.*

Required follow-up actions discussed for post-meeting coordination:

City of Lebanon:

- Provide abutters list for ROW to D&K.
- Secure 5/23 and 6/6 community meeting venue, DHMC, and related logistics
- Verify project partner permission for logo usage in presentation slides
- Prepare and deliver public notice of 5/23 meeting to abutters and community in general and outreach plan for remainder of project (e.g., site postings, media, timing, etc.)
- Develop project FAQ and for City website via Planning's "Reports, Studies..." page; page to include project purpose and scope; timeline; final meeting presentation PDFs, photos of boards, handouts and minutes; public comment contact; and news section for posting meeting notices and project updates.
- Notify DOT District 2 Engineering Office and Traffic Division of meetings and to ascertain if there are current traffic accounts that should be incorporated with traffic analysis. There may be elements to coordinate on following 5/23 meeting for right-of-way, signal timing and crosswalks.

D&K:

- Provide draft presentation for 5/23
- Provide invoice and financial summary documentation with updated personnel list reflecting new name and title for Project Engineer replacing staff identified in original budget (Matthew Bradley)

Post-meeting addenda concerning required follow-up actions:

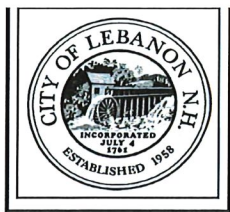


1. Following the meeting's conclusion, the City was informed that, due to a job change, the Project Engineer role will be filled by another staff person to be named at a later date.
2. D&K to include 5/23 and 6/6 public meeting notice flyers in Engineering Study (Appendix) per direction from Robert Hudson, NHDOT.

Mr. Benoit closed the meeting at 3pm-

If these minutes are incomplete or not to your understanding of the meeting, please contact the preparer.

Cc: Attendees



CITY OF LEBANON ~ PLANNING & DEVELOPMENT

May 11, 2018

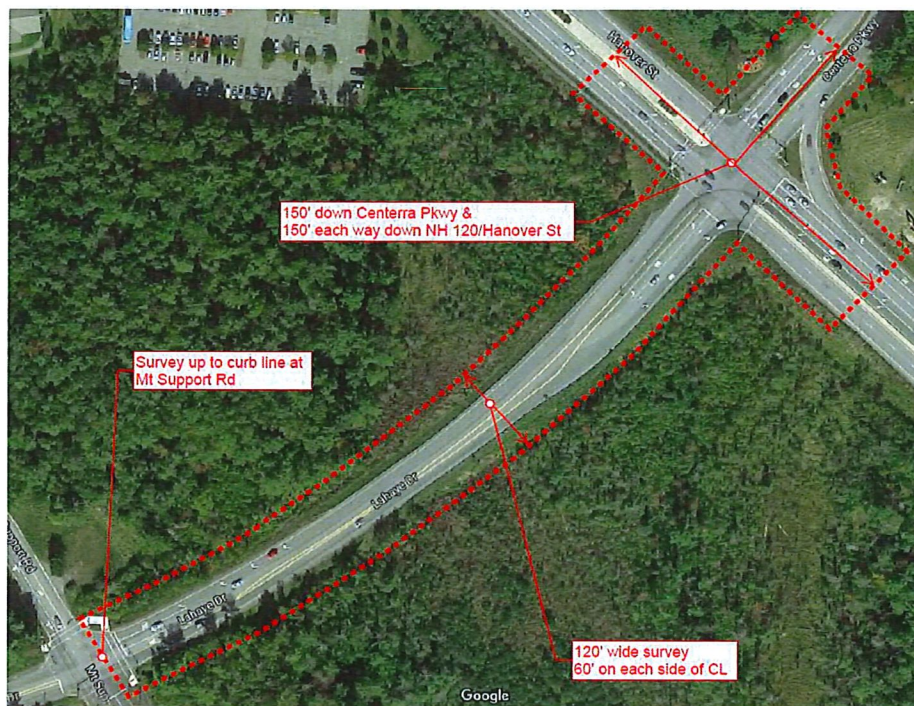
Public Concerns Meeting May 23, 2018 to Review Engineering Study for Shared Use Path at Lahaye Drive & Rt. 120

Dear Community Member:

You are invited to attend a meeting on May 23rd to learn about a bicycle/pedestrian facility improvement project along Lahaye Drive, between Route 120 and Mt. Support Road. The proposed project is approximately 950 linear feet of paved shared use path, which will be sited in the project area depicted in the image below.

The project sponsor is the City of Lebanon ("City"), the engineering consultant is Dubois & King, Inc. ("Consultant"), and the New Hampshire Department of Transportation ("NHDOT") is the program administrator. The City was awarded \$640,000 in Transportation Alternatives Program grant funding under the 2016 cycle.

The City's primary local partners and stakeholders for the path include Dartmouth Hitchcock Medical Center and Dartmouth College, and their respective employees, visitors, and residents, as well as those with relationships to surrounding properties, such as the Centerra business park, Element Hotel and forthcoming Altaria housing development.



The meeting will be held from 4-6pm on Wednesday, May 23rd in Auditoriums A&B of Dartmouth Hitchcock Medical Center, located at 1 Medical Center Dr., Lebanon, NH 03766. If you have not been to this DHMC facility location before, please see <https://goo.gl/maps/5FwTJHSqHq32> and the [building floorplan linked here](#); from the Main Entrance on Level 3, take a right just after passing the Info Desk and the auditoriums are on the right side of the corridor. Light refreshments will be provided.

Meeting objectives include review of:

- project scope
- design and engineering study findings to date, such as topographic survey, utilities and right of way, resource constraints, and traffic analysis
- project schedule
- stakeholder input, with an opportunity for attendee Q&A

This is the first of several public participation opportunities, so if you are unable to attend this meeting, but would like to share written comments or be informed of future engagement opportunities, contact Rebecca Owens, at Rebecca.Owens@lebcity.com or 603-448-1457. All project abutters will also be notified of the Presentation of Proposed Action meeting, which will be in June 2018.

Please share this notification with your organization(s) and other stakeholders as appropriate. Suggested opportunities for ensuring awareness of this forum for public feedback include printing and posting a hardcopy of this letter to high-visibility bulletin boards, mentioning the meeting in an electronic newsletter or similar announcement, and website event/calendar updates.

Sincerely,



Rebecca Owens
Associate Planner

Cc: Shaun Mulholland, City Manager, Lebanon
David Brooks, Director of Planning & Zoning, Lebanon
Mike Lavalla, Director of Public Works, Lebanon
Darren Benoit, VP & Transportation Division Director, Dubois & King, Inc.
Robert Hudson, Civil Engineer V, NH Department of Transportation
Ellen Arnold, Director of Real Estate, Counsel for CP&F, Dartmouth College
Steven Cutter, Director of Engineering Services, Dartmouth Hitchcock Medical Center



Project: TAP Lahaye Drive Multi-Use Path Date
Federal #: X-A004 (617)
NHDOT #: 41366
Dubois & King #: 624260

Issued: 6-7-2018
Meeting Date: 5-23-2018
Location: DHMC Level 3 Aud. A & B
Time: 4:30 PM

Project Public Concerns Meeting Minutes

Regarding: NHDOT Transportation Alternatives Program (TAP), Lebanon NH – Lahaye Drive Multi-Use Path Local Concerns Meeting

Attended By: (See Attached Sign-In Sheet)

Attachments: Sign-In Sheet

Prepared By: Brian Breslend, P.E., DuBois & King

MEETING NOTES

The meeting began at approximately 4:30 PM.

Rebecca Owens, Associate Planner from the City of Lebanon Planning & Zoning Department organized the meeting. Darren Benoit, P.E., the Project Manager for the project consultant, DuBois & King (D&K), conducted the presentation, providing an overview of the project including: funding, LPA/TAP design process, project schedule, project limits, a regional plan and next steps. Mr. Benoit's team included Brian Breslend, P.E., Senior Project Engineer.

Existing Conditions

An attendee commented that the existing pavement markings (arrows) as shown on D&K's existing conditions plan were incorrect. D&K concurred with the attendee's assessment and noted that the plans would be updated.

Natural Resources

D&K noted the anticipated impacts to the project. Architectural or Archaeological impacts are not anticipated as there are no known resources in the immediate area. There are wetlands at the toe of slope of Lahaye Drive on either side of the roadway. Due to the existing grading, any multi-use path constructed along Lahaye Drive would impact wetlands. These are anticipated to include temporary and permanent wetland and buffer impacts. D&K mentioned that these impacts could be minimized, depending on the location of the multi-use path, the use of reinforced slopes, or the implementation of a retaining wall. Additionally, D&K mentioned that



there is the potential to impact endangered or threatened bat habitat as the wood line is at the toe of slope of the roadway.

Signage

Active bicyclists that attended the meeting pointed out that the existing bicycle signage in the area is confusing. There is a lack of proper signage in some areas and conflicting signage in other areas. City officials noted the concern.

Design

There was a question about the recommendation for a path for both pedestrians and bicyclists. An attendee felt that the only bicyclists using the corridor were experienced and would either use the paved shoulder or ride in the travel lane with motorists. A sidewalk was discussed as an alternative. David Brooks, Planning and Zoning Director, mentioned that there are other planned multi-use paths being developed in the near future and that there were going to be residential development projects on NH Route 120, just south of Centerra Parkway. These residential housing units are anticipated to have families and Dartmouth-Hitchcock employees that may be more likely to use a multi-use path as opposed to roadside use.

Mr. Brooks discussed the future bicycle/pedestrian plans in the area. There is a multi-use path that has been designed and ready for construction along NH Route 120. It begins near the Altaria development and extends to Centerra Parkway. Mr. Brooks mentioned that there is a lack of funding for the construction of this project. The construction cost estimate is higher than allowable funding so the City will need to pay for the difference in the estimate versus the allowable funding.

Mr. Benoit questioned the crowd about the potential addition of amenities such as a bench within the project segment. A bench at the NH Route 120 intersection may not be the most attractive location due to the higher vehicle speeds and volumes. Alternatively, Mr. Benoit suggested a bench might be a welcome respite at the intersection of Mount Support Road and Lahaye Drive. This area offers lower vehicles speeds and volumes and is an advantageous location as it is approximately halfway between DHMC and the Centerra Parkway business park. The public generally agreed that this appeared to be a good idea. Due to the presence of wetlands at the base of the slope on both sides of Lahaye Drive, addition of a bench within the corridor would likely increase wetland impacts.

There was a general discussion regarding fencing and guardrail along the project. Mr. Benoit stated that the existing guardrail located along either side of Lahaye Drive would likely be retained. Even with the addition of a path, a crash resistant barrier would be needed to protect vehicles from the steep slopes and further protect pedestrians. Similarly, Mr. Benoit mentioned that fencing may need to be installed on the outside of the path depending upon the available recovery area, the slope of the embankment or the addition of a retaining wall. Mr. Benoit suggested the use of wooden rail or chain link fence. The attendees appear to have no adverse opinion to the type of fencing. An attendee requested that the fencing be installed two to three



feet away from the bike path as bicyclists tend to move away from this obstacle. Mr. Benoit stated that if fencing was installed it would be placed an adequate distance away from the path.

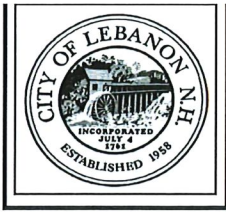
There was a discussion about the lack of “no right turn on red” traffic signal for NH Route 120 right turn movements on to Centerra Parkway. Attendees were concerned with pedestrian and bicyclist conflicts with this movement. The City took note of this concern.

Mr. Brooks asked Mr. Benoit if the crosswalk and approaches from the Altaria multi-use path could be added to the Lahaye Drive project. Mr. Benoit stated that was possible, and would look into it further.

Other

An attendee asked next steps, which would be the alternatives presentation. Mr. Benoit stated there would be two alternatives presented. Advantages and disadvantages of each alternative would be stated and discussed. These would include but not be limited to construction costs, environmental impacts, drainage issues and signalization issues.

An attendee requested the slides from the presentation. He said it would be helpful if he wanted to talk to other interested parties about the project. Rebecca stated she would provide the slides via the City’s website.



CITY OF LEBANON ~ PLANNING & DEVELOPMENT

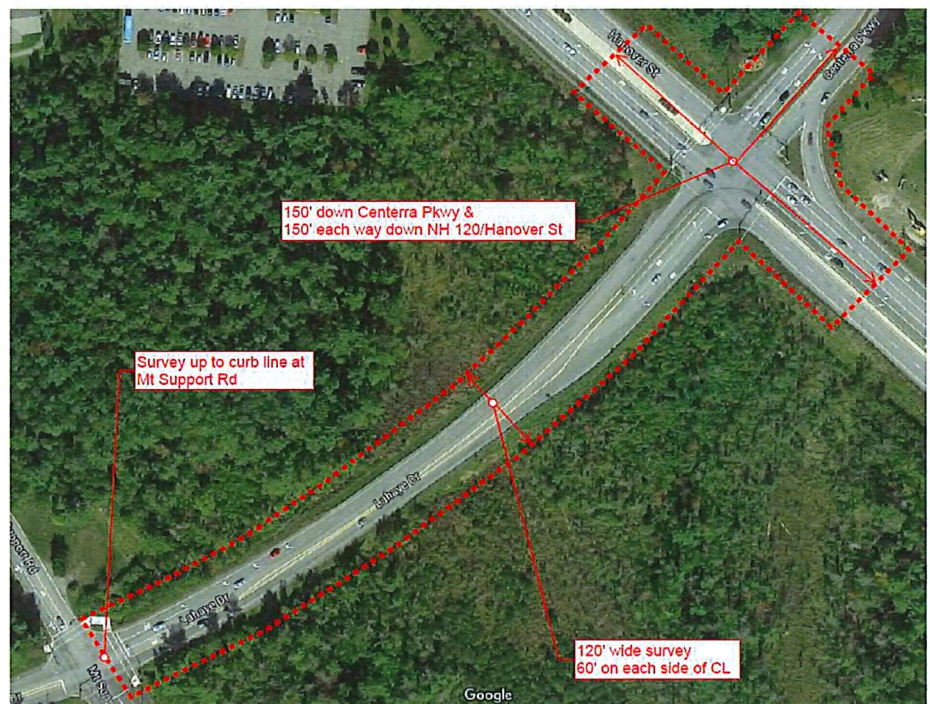
May 30, 2018

Alternatives Analysis - 12pm June 13, 2018 - Open Meeting Engineering Study for Shared Use Path at Lahaye Drive & Rt. 120

Dear Community Member:

You are invited to attend a meeting on Wednesday, June 13th, to learn about a bicycle/pedestrian facility improvement project along Lahaye Drive, between Route 120 and Mt. Support Road. A high-level overview of the path, which is proposed to be sited at the location shown in the image below, was introduced at the Public Concerns meeting of May 23rd. The meeting in June will be more in-depth. All prior and current notification flyers and minutes from project presentations, as well as other materials, will be available at <https://lebanonnh.gov/632/Documents-Studies-Resources> and are also on file and accessible to the public at the City's Planning & Zoning Department.

The City's primary local partners and stakeholders for the path, including Dartmouth Hitchcock Medical Center and Dartmouth College, have been directly notified; their representatives and employees, as well as local residents, visitors and those with relationships to surrounding properties, such as the Centerra business park, Element Hotel and forthcoming Altaria housing development are encouraged to attend the meeting on June 13th to ask questions and review conceptual design ideas prior to ensuing project milestones such as review of a proposed action.



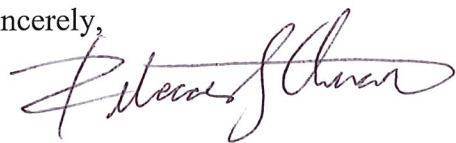
The meeting will be held from 12-2pm on Wednesday, June 13th in Auditoriums A&B of Dartmouth Hitchcock Medical Center, located at 1 Medical Center Dr., Lebanon, NH 03766. If

you have not been to this DHMC facility location before, please see <https://goo.gl/maps/5FwTJHSqHq32> and the [building floorplan linked here](#); from the Main Entrance on Level 3, take a right just after passing the Info Desk and the auditoriums are on the right side of the corridor. Light refreshments will be provided.

This is the second of several public participation opportunities. If you are unable to attend this meeting, but would like to share written comments or be informed of future engagement opportunities, contact Rebecca Owens, at Rebecca.Owens@lebanonnh.gov or 603-448-1457. Please share this notification with your organization(s) and other stakeholders as appropriate. Suggested opportunities for assisting

with public awareness of the meeting: print and post a hardcopy of this letter to high-visibility bulletin board, mention the meeting in an electronic newsletter or similar announcement, and add it to website event/calendar updates. Thank you for your engagement.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Rebecca Owens', with a stylized, flowing script.

Rebecca Owens
Associate Planner

Cc:

Shaun Mulholland, City Manager, Lebanon
David Brooks, Director of Planning & Zoning, Lebanon
Bruce Temple, Assistant Director of Public Works, Lebanon
Darren Benoit, VP & Transportation Division Director, Dubois & King, Inc.
Robert Hudson, Civil Engineer V, NH Department of Transportation
Ellen Arnold, Director of Real Estate, Counsel for CP&F, Dartmouth College
Steven Cutter, Director of Engineering Services, Dartmouth Hitchcock Medical Center
Thomas Goins, Vice President of Facilities, Dartmouth Hitchcock Medical Center

Project: TAP Lahaye Drive Multi-Use Path Date
Federal #: X-A004 (617)
NHDOT #: 41366
Dubois & King #: 624260

Issued: 7-3-18
Meeting Date: 6-13-2018
Location: DHMC Level 3 Aud. A & B
Time: 12PM

Alternatives Presentation Meeting Minutes

Regarding: NHDOT Transportation Alternatives Program (TAP), Lebanon NH – Lahaye Drive Multi-Use Path Alternatives Presentation Meeting

Attended By: (See Attached Sign-In Sheet)

Attachments: Sign-In Sheet

Prepared By: Brian Breslend, P.E., and Darren Benoit, P.E., DuBois & King

MEETING NOTES

The meeting began at approximately 12:00 pm. Rebecca Owens, Associate Planner from the City of Lebanon Planning & Zoning Department organized the meeting. Introductions proceeded, including indication of how attendees heard of the meeting, as a data point of interest to effective promotion of future meeting notices; responses ranged from the LebNews electronic bulletin posted by the city and direct email/mail notices to abutters to a Valley News calendar listing, and the Vital Communities listserv announcement. Darren Benoit, P.E., the Project Manager for the project consultant, DuBois & King (D&K), conducted the presentation, providing an overview of the project including: funding, LPA/TAP design process, project schedule, project limits, a regional plan, alternatives, cost estimates and next steps. Mr. Benoit's team included Brian Breslend, P.E., Senior Project Engineer.

Alternatives

D&K presented four alternatives for the path design, which overall is approximately 950-foot long and 10-foot wide (surfaced part between 3 feet of shoulder on either side where possible). For each alternatives analysis:

1. The first alternative is a no-build scenario to represent implications if there is no change to the project site.
2. The second alternative was a multi-use path on the north side of Lahaye Drive. It consisted of two three-foot aggregate shoulders, accommodations for a grass swale for drainage, a 10-foot bituminous path, a fence and either a sloped embankment.
3. The third alternative was a similar path, but located on the south side of Lahaye Drive.
4. A fourth alternative was presented that could be on either side of the road. It consisted of a granite curb at the edge of the existing road with seven-inch reveal, a five-foot buffer strip of which three feet is aggregate shoulder for the path and a two-foot grass strip, a 10-foot bituminous multi-use path, a three-foot aggregate shoulder with guardrail to protect both motorized vehicles and bikes and pedestrians from the sloped embankment.

5. Two sub-alternatives to 2 & 3 were also noted, except that a retaining wall was proposed to limit wetland impacts.

Safety

Several of the attendees expressed concerns about pedestrian and bicyclist safety. Attendees did not prefer alternative four. Alternative four would provide buffer space from the paved roadway shoulder, curbing and a five-foot buffer from the curb to the path, but the attendees did not feel comfortable with this alternative. They preferred alternative two or three due to the guardrail separating the vehicle traffic and pedestrians and bicyclists, and also as relates to the need for snow removal and storage that does not inhibit path use or safety.

Attendees raised concerns about traffic accidents along Lahaye Drive and at the intersection with NH Route 120. This information will be included in the engineering study. The City stated they would provide that information when the meeting minutes and presentation was uploaded to the City's website.

In addition to the above concerns, participants were interested in learning about potential linkages between the path and crosswalks over Route 120 to access the Centerra-area properties. Mr. Benoit stated that in general, crosswalk costs are included in contingency costs for the project, however coordination with NHDOT will be necessary to assess traffic light signalization needs that may be beyond the project scope.¹

Engineers Opinion of Probable Construction Cost (EOPCC)

The EOPCC varied greatly for all alternatives presented. At \$399,000, the lowest EOPCC was alternative two with the embankment. The highest alternative presented was sub-alternative 3 with the retaining wall at an EOPCC of \$877,000.

The attendees asked about available funding for this project. Mr. Benoit stated that the current budgeted construction funding was \$550,000. This funding would be adequate for alternatives two (embankment), three (embankment) and alternative four.

Mr. Bill Lamb asked about what would happen if the EOPCC of preferred alternative that was selected was above the allocated funding for the project. Mr. Benoit stated that the City could request additional funding from the Department of Transportation (DOT). Additionally, Mr. Benoit stated that it is not uncommon for a project scope to be modified. Modifications to the project budget would be evaluated based upon merit by the NHDOT (this relates to Footnote 1, below).

Design

Mr. Reitz, an active cyclist, questioned the current sidewalk ramp locations at the NH Route 120 and Centerra Parkway intersection. Ms. Owens stated that a shared use path is in the planning stages to

¹ Note: The City previously queried if D&K might also be able to incorporate a crosswalk connection design and construction costs for a facility from the northeast corner of the intersection to the southeast corner, in order to tie in with the Altaria path being planned at the latter corner, without exceeding the available total project monies. Such an update to project tasks would potentially require a TAP project amendment or another mechanism to pursue, unless there is the ability to include it as a sub-alternative akin to the retaining wall options identified herein.

connect Altaria, a development along the southeastern area of the Route 120 intersection, with Centerra. Currently the proposed layout is to have pedestrians and bicyclist cross from the Altaria pathway to a grass island, crossing through the NH Route 120 slip lane. From there they would need to cross the Centerra Parkway eastbound travel lanes to a median then cross the westbound travel lanes. Mr. Reitz suggested continuing the path up Centerra Parkway and connecting with the existing crosswalk near the intersection with Morgan Drive. Ms. Owens stated that the addition of that segment is likely outside the project's scope. One participant also asked about a previously considered design that incorporated an existing west-east pedestrian path located off of Mt. Support Road, to the north of the current alternatives under consideration and potentially as a means of reducing land clearing and wetlands impacts; while such a path does connect DHMC with sidewalk on the west side of Route 120, the route passes through private property and parking lots and is not graded or surfaced for accessibility, such that as a facility for the general public, it is not viable.

Future Growth

Mrs. Jenny Lamb asked the City and D&K if the location of the path was chosen based upon future traffic growth. Specifically, Mrs. Lamb asked if an additional travel lane would be added to Lahaye Drive, which would result in the path needing to be moved. Mr. Benoit stated that the location of the path was not chosen based upon future traffic growth. Ms. Brittner, the City of Lebanon's Assistant Engineer stated that Lahaye Drive has adequate vehicle capacity both currently and into the future, based on the fact that it was relatively recently designed to accommodate for projected increases.

Environmental Impacts

All proposed build alternatives have impacts to both wetlands and potential bat habitat. Wetland impacts varied from approximately 11,000 square feet for sub-alternatives to #2 and 3 (retaining wall) to approximately 18,000 square feet for alternative 2 (embankment). For clearing, all build alternatives were fairly consistent; the impacts ranged from 0.3 to 0.5 acres of clearing in total. D&K stated that a meeting with the state's natural resources committee is required to review the alternatives and potential impacts for each prior to them being able to support a preferred alternative recommendation to the City.

Other

Mr. Gould asked who would be using the proposed path. Ms. Owens stated that the City anticipates immediate users of the path would be patients and employees of the hospital and employees in the neighboring Centerra Business Park located on the opposite side of Route 120. There are also plans for residential development in the immediate area, in parcels adjacent to Centerra, including Altaria. Future users could then include young professionals and family groups. The anticipated demand for path utilization is addressed in the project's Purpose and Needs Statement.

Path signage was also discussed. One attendee noted that DHMC's paths, while open to the public, are not intuitive and that makes them less user-friendly for outsiders to try for recreation. Ms. Owens has received public comment concerning a similar shared use path, the existing facility on Mt. Support road; there is sometimes confusion over where pedestrians can safely walk due to higher speed bicyclists utilizing the path instead of the roadway. Signage about appropriate path usage should be considered for the Lahaye path and other facilities in Lebanon, in general.

APPENDIX F

LEBANON BLUEPRINT FOR COMMUNITY TRAILS

Blueprint for Community Trails

A Vision for Better Walking, Biking, and Living in

Lebanon, New Hampshire

Special thanks to the following for project funding:
Connecticut River Joint Commission's Partnership Program
Upper Valley Trails Alliance

Walk and Bike to Work

If you live close enough to your job, walking or bicycling to work can be a healthy, easy and money-smart alternative to driving. Most of the City's major employers are well within walking and biking distance of Lebanon's neighborhoods.

Safe and attractive walking and bicycling routes should be developed as an integral part of the City's transportation system. Pedestrian, bike and skiing tips to work can be supported by the Advance Transit system with installed bike and ski racks, and improved bus shelters at trailheads. Building a network to serve walking, bicycling, and skiing to work will require improvements to streets, sidewalks, trails and paths. Untapped employer relationships such as incentives and education need to be developed. Some ideas:

- Place a priority on safe biking and walking routes, including trails and paths, that link highly populated Lebanon neighborhoods with major employers such as DHMC, Centerra Park, Timken Aerospace, and Alice Peck Day Hospital.
- The Northern Rail Trail should be expanded and improved as the east-west spine for the system, leading to trail or route "spokes" that connect to major employment and recreational destinations.
- Create additional trail links along the Connecticut and Mascoma Rivers for a connected system of river walks between downtown Lebanon and West Lebanon.
- Encourage employers to provide lockers, showers, changing rooms, and commuter programs that support employees who leave their cars at home.
- Reduce parking requirements and impact fees in City permitting for employers that provide bike/pedestrian facilities.
- Change City impact fee policies to encourage or even require alternative transportation as acceptable traffic mitigation and allow impact fee expenditures for bicyclist and pedestrian facilities.



Introduction

Obesity in America is on the rise. Nearly three quarters of U.S. adults don't exercise enough to meet public health standards. At the same time, car use is soaring. What can be done to reverse these troubling trends? Research indicates that better community design can promote physical activity by presenting attractive alternatives to the automobile.



www.pedbikeimages.org / Dan Burden

Studies have shown that regular physical activity improves health and quality of life. Adults can reduce the risk of chronic disease (i.e., heart disease, adult diabetes, obesity) with just 30 minutes of moderate exercise, such as brisk walking, five or more days per week. Many Americans report they want to walk more for exercise or to get to specific places, yet find their communities lack the infrastructure to make that possible.

Lebanon is fortunate to have a number of existing parks, paths, and attractive, walkable neighborhoods that can underpin a network of community trails. Physical improvements to deteriorated facilities, along with enhancements to calm traffic, increase pedestrian safety, and expand the sidewalk and trail system, are essential to making Lebanon a more bicycle and pedestrian friendly city.

The planning process for the **Blueprint for Community Trails** culminated in a public workshop held in March 2006, attended by approximately 90 City residents and invited visitors. In the course of the evening, a lively series of break-out sessions devoted to a variety of topics involving bicycle and pedestrian planning were held. The visions defined in that workshop have been distilled into this summary.

Accessibility

Accessibility refers to removing barriers that prevent any individual from enjoying the benefits of walking and bicycling within Lebanon, both in the City's core areas and outlying open spaces. It includes addressing the specific needs of persons with impaired mobility, as well as other broader issues such as speeding traffic, which present barriers to walking for the general public.

Addressing the specific needs of persons with impaired mobility is a City obligation required by federal law. Based upon feedback from people with disabilities, the City should employ ADA improvements strategically within the public realm where people need barrier-free access to essential goods and services.

- Because the downtown is the center of the community and the home of many people who are elderly or have disabilities, efforts to make it more accessible and safe for pedestrians should be given first priority.
- Improve the City's sidewalks and crosswalks to comply with ADA requirements pertaining to ramps, detector pads, and signage.
- Identify appropriate trails that can provide ADA access to natural areas, and make new trails ADA accessible. Connect safe walking, biking, and ADA accessible routes to public transit, where possible.
- Keep in mind that a safe and comfortable environment benefits everyone.



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Safe Routes to School

Lebanon's school children would get more exercise and the City's traffic congestion could be reduced if more students walked or bicycled to school. In 1969, half of all U.S. children walked or rode a bike to school; today that number is less than 15%.



The City's Pedestrian and Bicyclist Advisory Committee has initiated a federally funded **Safe Routes to School (SR2S)** program in conjunction with state transportation officials. This effort will address the need to improve safety between neighborhoods and schools and result in:

- Physical improvements to streets and sidewalks to improve the environment for walking.
- Education for walkers, bicyclists and drivers to promote safety.
- Assistance for the City and School District in creating policies that encourage walking and bicycling to school.

Some of the major initiatives for promoting Safe Routes to School include:

- Create a "walking school bus" with parents leading walks to school. Increase school patrols, in-class safety education programs, and crossing guards to provide a better adult presence for children walking to school.
- Create designated (and enforced) 20 MPH school zones. Implement plans for improved signage, traffic calming, and street and sidewalk improvements.
- Install weather-protected and secure areas for bike parking at each school.
- Address pedestrian safety "hot spots" in the City where higher pedestrian and bike use are threatened by unsafe traffic speeds and volumes. Implement traffic calming designs for areas such as around Coburn Park, along Hanover Street, LHS parking lot/Evans Drive, and along Messenger and Prospect Streets.
- Create incentives for kids to ride bikes to school such as **Kids & Cops** partnerships for safety, incentive passes and certificates, loaner helmets, and bike locks for regular bicyclists.
- Broaden School District/City relationships to include the Pedestrian and Bicyclist Advisory Committee, and to leverage **SR2S** funding sources.

Connect Conservation Lands

Lebanon has many parcels of conserved public land along the City's streams and rivers, hilltops, and valleys. Most of these have well-established public recreational trails.

By linking trails, roads, and natural areas with adjacent neighborhoods, an attractive network of connected green spaces could be achieved. Some ideas:

- Continue collaborating with the Lebanon Rotary Club, on implementing the "String of Pearls." This vision of a riverfront trail system would connect park lands and the rail trail along the Mascoma and Connecticut Rivers.
- Build trail connections between the City's parks and open space parcels and the Northern Rail Trail. Continue efforts to connect City schools to conserved lands for educational and recreational value.
- Improve management of public trails to preserve ecological and historical resources, enhance trail maintenance, and develop better trail assessment and construction skills in association with the Upper Valley Trails Alliance and appropriate City Boards and Commissions.
- Improve conservation property access and signage at trail heads and consider amenities such as warming huts and public rest rooms.
- Promote planning with appropriate stakeholders to connect conserved public lands with private lands through developer and conservation agreements that combine natural resource protection and trail access.



10 Keys to Livable/Walkable Communities

Source: Dan Burden, Walkable Communities, Inc.

- Compact, lively town center, a variety of stores catering to local products and services.
- Many linkages to neighborhoods using walkways, trails and roadways, with appropriate ADA design.
- Many downtown and neighborhood streets are low speed.
- Neighborhood schools and neighborhood parks; residents living within 1/4 mile of a park.
- Children, teenagers, older adults and disabled are common in most public places and drinking fountains, restrooms and sitting places are provided.
- Street crossings are convenient, safe and easy, with short waiting times.
- Lots of well attended public space, green streets and a heritage of trees or other open space; natural trails and passageways are featured.
- Land use and transportation under control; mixed uses planned; choice of travel offered.
- Public space is celebrated, and festivals parades and concert venues are fun and welcoming.
- Lots of people walking; lingering in public places is encouraged.



www.pedbikeimages.org / Dan Burden

References

Active Living by Design Website (<http://www.activelivingbydesign.org/>)
Advance Transit Website (<http://www.advanceatransit.com/smallmap.html>)
City of Lebanon Recreation Facilities Master Plan
City of Lebanon Trails & Recreation Map
City of Lebanon Zoning Ordinance - Adopted December 5, 1990; Revised May 7, 2003
City of Lebanon Proposed Zoning Ordinance - October 25, 2006
FHWA Safety/Safe Routes to School Website (<http://safety.fhwa.dot.gov/saferoutes/>)
New Hampshire DOT Bicycle/Pedestrian Information Center Bike Maps Website (<http://www.nh.gov/dot/nhbikeped/maps.htm>)
Robert Wood Johnson Foundation (<http://www.rwjf.org/>)
Walkable Communities, Inc. (<http://www.walkable.org/>)

Getting Down and Dirty

Many of Lebanon's trails were not systematically designed, but evolved from informal historical use that became permanent. Proper planning and design is the foundation of sustainable trail maintenance, and a critical aspect to the success of the City's trail system. Severely eroded trails and other unmaintained and impacted areas will require rehabilitation or relocation to better serve users and protect their natural settings.

- City trails and their design should respond to their context and the anticipated trail users.
- Over time, the trail network should be incrementally improved using appropriate standards that will facilitate sustainable maintenance practices, public access management, and environmental stewardship.
- A range of trail designs, from heavily used "in-town" sections to footpaths in more remote areas, should be developed in consideration of pedestrians, bicyclists, skiers, and mountain bikers.
- Addressing connectivity between trail-accessed areas will allow use to be spread more evenly across the City, and promote a complete trail program instead of the current isolated arrangement of trails at each conservation property.

Trails to the Future

Trail connections can be created in conjunction with new development, as envisioned in the updated **City Master Plan** and proposed zoning amendments. With a trails plan in place, new trail links can build upon and expand opportunities for recreation, transportation and access to both developed sites and preserved areas. New trails and bikable and walkable streets can be provided as a part of new residential and commercial development, as well as city and state road projects. Some important connections include:

- Extend the Rail Trail from east to west as the core of the trail system.
- Develop the "String of Pearls" riverfront parks and trails, and connections to DHMC, Centerra Park, and Lebanon High School.
- Improve the "triangle" linking population and employment centers in Hartford, Hanover and Lebanon with employment centers in the region.
- Make connections to West Lebanon, White River Junction, Hanover, Enfield and Plainfield.

Partners

Partnerships and cooperation are needed every step of the way to achieve the vision of the Blueprint for Community Trails. Partners are needed to plan, build and maintain the system.

There are numerous potential partners such as neighborhood groups, business owners, land owners, user groups, youth groups, conservation organizations, and local and regional planning associations that can advance this vision of a connected, walkable Lebanon. In short YOU!

Potential partners include:

Arts Organizations
Connecticut River Joint Commissions
Connecticut River Watershed Council
Dartmouth Outing Club
Dartmouth Real Estate Office
DHMC - Employee Health Improvement Program
DHMC - Facilities Management
DHMC - Trails For Life Program
EMS
Enfield Planning Staff & Conservation Commission
Friends of the Northern Rail Trail
Hanover Bike and Pedestrian & Mountain Bike Committees
Hanover Planning Department & Conservation Commission
Hanover Recreation Department
Hanover Trails Committee
Hartford Parks and Recreation
Hartford Planning Staff & Conservation Commission
Hypertherm
Lebanon ADA Compliance Committee
Lebanon Pedestrian and Bicyclist Advisory Committee
Lebanon City Council & City Manager
Lebanon Class VI Roads Committee
Lebanon Housing Authority
Lebanon Outing Club
Lebanon Planning Staff & Conservation Commission
LL Bean
National Park Service
NH Bureau of Trails
NH DOT Bicycle/Pedestrian Information Center
Norwich Planning Staff & Trails Commission
Plainfield Planning Staff & Conservation Commission
Regional Planning Commissions
Residential & Commercial Developers
Teleatics
Twin State Trailbustlers
Upper Valley Mountain Bike Association
Upper Valley Scene
Upper Valley Trails Alliance

Making Tracks: Implementing the Blueprint

This plan is a long term vision. Taken in manageable pieces it can become a reality. The following "top ten" items can help to make Lebanon a more walkable and bikeable community through changes in city policy, focused volunteer efforts, and funded initiatives.

1. Support local and regional trail planning and management through participation in the Upper Valley Trails Alliance.
2. Create a regional trail crew with skilled staff and trained volunteers to make the city's trails safer, better marked, less environmentally impacting, and more attractive.
3. Treat trail projects as regularly financed capital improvements to city lands. Fund them through the City's Recreation Department and Conservation Commission.
4. Petition NHDOT to allow the extension of the Northern Rail Trail to Glen Road.
5. Develop detailed trail improvement plans for connections from West Lebanon Village and Sachem Village to the Boston Lot and DHMC.
6. Develop a conceptual trail alignment plan for a trail linking DHMC to the Lizzie Elliot Property on Mascoma Street Extension.
7. Where appropriate, upgrade existing trails on conservation land to meet ADA standards.
8. Prepare conceptual plans for a Connecticut River trail from Bridge Street and the Westboro Yard to the mouth of the Mascoma River.
9. Prepare **Safe Routes to School (SR2S)** improvement plans for traffic calming, pedestrian connections, and new and improved bike routes, and then pursue state SR2S funding.
10. Require in the City's development regulations that all new projects provide amenities for bicyclists and pedestrians and contribute to a citywide system of interconnected trails and safely bikeable and walkable routes.



APPENDIX G

LEBANON COMPLETE STREETS POLICY

City of Lebanon – Complete Streets Policy

VISION AND PURPOSE

The City of Lebanon is a thriving small City that is the regional center of the Upper Connecticut River Valley. Lebanon has just over 13,000 residents, but experiences an influx of as many as 19,000 daily commuters for employment, shopping, and services, which makes transportation a key component in achieving the goals of the City's 2012 Master Plan.

The Vision statement of the Master Plan's Transportation Chapter states:

"The City of Lebanon's transportation systems shall be balanced and integrated in order to improve mobility, enhance resident's quality of life, improve the attractiveness of our neighborhoods, and support planned regional growth. Transportation decisions shall be based on environmentally sound and health-promoting principles, shall focus on reinforcing Lebanon's residential neighborhoods, and shall be pedestrian and bicycle friendly.

"The City of Lebanon shall strive for a balanced and integrated multi-modal (the combination of transit, motor vehicle, air, rail, pedestrian, and bicycle transportation) transportation systems that provides incentives for increased use of transit, bicycle, and pedestrian modes; supports compact, mixed-use development; reduces carbon footprints, and contributes to decreases in both traffic congestion and volumes. The City shall approach transportation issues with an eye to the prevention of future challenges, as well as seeking to remedy problems and support sustainable development."

With this Vision in mind, the Master Plan specifically describes "Complete Streets" as one policy the City can employ to improve mobility and safety for all users. "Complete Streets" are streets designed and operated to enable safe access and mobility for all users, regardless of age and ability, so that pedestrians, bicyclists, motorists, and transit users are able to safely move along or across City streets.

The goal of this Complete Streets policy is to assemble and codify portions of the 2012 Lebanon Master Plan into a document that will guide and inform planners, engineers, and policy makers going forward and to ensure that the City of Lebanon's streets and public ways will be convenient, safe, and accessible for all transportation users, including pedestrians, bicyclists, transit vehicles and riders, regardless of age and physical ability.

CORE COMMITMENT

All Users and Modes

The City of Lebanon shall plan, design, construct, operate, and maintain appropriate facilities for pedestrians, bicyclists, motorists, transit vehicles and riders, and all other users, in all new construction, retrofit, or reconstruction projects, subject to the exceptions contained herein.

Planning

The City of Lebanon shall incorporate Complete Streets principles from the City's Master Plan, into area plans, transportation plans, the Zoning Ordinance, Subdivision Regulations, and Site Plan Review Regulations, and other documents, regulations, and programs as appropriate.

Projects and Phases

The City of Lebanon shall approach every transportation improvement and project phase as an opportunity to create safer, more accessible streets for all users. These phases include, but are not limited to: planning, programming, design, right-of-way acquisition, construction engineering, construction, reconstruction, operation, and maintenance.

Complete Streets principles will be applied to all new City projects, privately funded developments, and incrementally on existing streets through a series of small improvements and activities over time. This policy also encourages the NH Department of Transportation to incorporate these principles in their state-initiated projects that are located within the City. Additionally, the City will strive to continue to improve connectivity with neighboring communities by asking and encouraging other communities to participate in Complete Streets design and implementation.

It is understood that maintenance activities do not necessarily trigger requirements for major street improvements and should not be expected to do so. However, maintenance activities do present some opportunities for smaller improvements that will result in better access and safety for roadway users.

Exceptions

Complete Streets principles will be applied to all street construction, retrofit, and reconstruction projects except in unusual or extraordinary circumstances outlined below. Even under the conditions outlined below, a project's impact will be evaluated for the effect it would have on the usefulness of the street for all users, now and in the future, and the ability to implement other adopted plans in the future:

1. Where pedestrians and bicyclists are prohibited by law from using the facility and where no alternative facilities and accommodations can be provided within the same transportation corridor.
2. Where the construction of walkways, bikeways, or other accommodations are not practically feasible or cost effective because of unreasonable adverse impacts on the environment, neighboring land uses, right-of-way acquisition, or would be disproportionate to the need, particularly if alternative facilities are available within a reasonable walking and/or bicycling distance.

3. Where application of Complete Streets principles is unnecessary or inappropriate because it would be contrary to the public safety and increase risk of injury or death.
4. Where regular maintenance or repair work does not require new design and engineering plans for a full retrofit of a street.

When construction, reconstruction, or retrofit of a street is proposed, any determination that a project will or will not meet Complete Streets principles based on the above exceptions will be reviewed and confirmed cooperatively among departments in the City of Lebanon and/or by the appropriate governing body.

BEST PRACTICES

Policies

The City shall utilize all adopted policies that relate to the right-of-way as appropriate, including:

- City of Lebanon Policy Statement on Design and Construction Standards for Streetscapes (June 27, 2012)

Design Guidance and Flexibility

The City shall utilize the latest accepted or adopted design standards available, including:

- American Association of State Highway and Transportation Officials (AASHTO)
 - o [Guide for the Development of Bicycle Facilities \(4th Edition, 2012\)](#)
 - o [Guide for the Planning, Design and Operations of Pedestrian Facilities \(2004\)](#)
 - o [A Policy on Geometric Design of Highways and Streets \(2011\)](#)
- American Planning Association (APA) & American Society of Civil Engineers (ASCE)
 - o [U.S. Traffic Calming Manual \(2009\)](#)
- Federal Highway Administration (FHWA)
 - o [Manual of Uniform Traffic Control Devices \(MUTCD\)](#)
 - o PEDSAFE: [Pedestrian Safety Guide](#) and [Countermeasures Selection System](#)
 - o [Guidance on Bicycle and Pedestrian Facility Design Flexibility](#)
- Institution of Transportation Engineers (ITE)
 - o [Designing Walkable Urban Thoroughfares: A Context Sensitive Approach \(2010\)](#)
 - o [Neighborhood Street Design Guidelines \(2010\)](#)
- National Association of City Transportation Officials (NACTO)
 - o [Urban Bikeway Design Guide \(2nd Edition, 2012\)](#)
 - o [Urban Street Design Guide \(2013\)](#)

- U.S. Architectural and Transportation Barriers Compliance Board (the Access Board)
 - [Accessible Rights-of-Way: A Design Guide](#)
- Active Transportation Alliance
 - [Complete Streets Complete Networks: A Manual for the Design of Active Transportation](#)

Public Participation

During the planning, design, and review phases of projects, every effort shall be made to encourage public participation and to incorporate feedback as part of the final project.

Context Sensitivity

During the planning, design, and review phases of projects, every effort shall be made to reflect the context and character of the surrounding built and natural environments, and when possible enhance the appearance and character of the existing street.

Streetscape amenities such as street trees, lighting, landscaping, and way-finding, should be incorporated where appropriate and feasible.

Stormwater

The City of Lebanon, in addition to providing safe and accessible streets, shall incorporate best management practices for addressing stormwater runoff.

Measures of Success

Complete Streets shall be regularly evaluated for success and opportunities for improvement. This policy encourages the evaluation of progress, including the following parameters when appropriate:

- User data – bike, pedestrian, transit, and traffic
- Crash data
- Use of new projects by mode
- Compliments and complaints
- Linear feet of pedestrian accommodations built
- Number of ADA accommodations built
- Miles of bike lanes/trails built or striped
- Number of transit accessibility accommodations built
- Number of street trees planted

IMPLEMENTATION

The City views Complete Streets as integral to everyday transportation decision-making practices and processes. To this end:

1. The Planning Department, Department of Public Works, and other relevant departments, agencies, or committees shall incorporate Complete Streets principles into current design standards, including Subdivision and Site Plan Review Regulations, future transportation regulations, Zoning codes, and other appropriate procedures, plans, rules, regulations, and other manuals and programs as appropriate.
2. The Planning Department and Department of Public Works, and other relevant departments, agencies or committees shall review current and future projects and applications, to ensure that they reflect the best available design guidelines, and effectively implement this Complete Streets policy.
3. The City shall make Complete Street practices a routine part of everyday operations, shall approach every transportation project and program as opportunity to improve streets and the transportation network for all users where feasible, and shall work in coordination with other agencies and jurisdictions in the implementation of such practices.
4. The City shall encourage staff professional development and training on Complete Streets attending conferences, classes, seminars, and workshops.
5. The City shall promote project coordination among City departments and agencies with an interest in the activities that occur within the public right-of-way in order to better use fiscal resources.
6. The Planning Department shall document progress on the implementation of this policy.

APPENDIX H

2012 LEBANON MASTER PLAN
TRANSPORTATION SECTION

MASTER PLAN

City of Lebanon 2012

*a comprehensive plan to implement
the community vision for 2030*

Adopted by the Lebanon Planning Board
March 26, 2012



Transportation

9|A

Vision & Purpose

The City of Lebanon's transportation systems shall be balanced and integrated to improve mobility, enhance resident's quality of life, improve the attractiveness of our neighborhoods, and support planned regional growth. Transportation decisions shall be based on environmentally sound and health-promoting principles, shall focus on reinforcing Lebanon's residential neighborhoods, and shall be pedestrian and bicycle friendly.

The City of Lebanon shall strive for a balanced and integrated multi-modal (the combination of transit, motor vehicle, air, rail, pedestrian, and bicycle transportation) transportation system that provides incentives for increased use of transit, bicycle and pedestrian modes; supports compact, mixed-use development; reduces carbon footprints, and contributes to decreases in both traffic congestion and volumes. The City shall approach transportation issues with an eye to the prevention of future challenges, as well as seeking to remedy existing problems and support sustainable development.

A transportation implementation plan is needed to attain this vision while coordinating and integrating its elements into other planning areas such as land use and economic development.

9|B

Issues & Priorities

9|B-1

Transportation and Land Use

For both residential and non-residential development, promoting a more compact land use pattern that can be efficiently served by multi-modal transportation systems is a priority.

9 | B-1a **Residential Development.** The residential neighborhoods within Lebanon's core areas are relatively densely developed and are located in proximity to the central business districts. These core areas are surrounded by sparsely populated residential and agricultural/forest land. The scattered residential development that has occurred in those outlying areas - such as Hardy Hill, Sunset Rock, Stevens Road, and Poverty Lane - is not efficient from a transportation standpoint due to its distance from commercial, civic and employment areas. This development pattern is stretching the City's services and infrastructure, in addition to the transportation system. Scattered rural residential development cannot be efficiently served by public transit and is too spread out for most residents to walk or bike to their destinations.

9 | B-1b **Nonresidential Development.** The commercial development that has occurred in Lebanon in recent decades is expansive and linear, especially along Route 12A. The Route 12A commercial district is a destination for shoppers from a large market area, which makes congestion and traffic accidents a particular concern. Excessive access points and turning conflicts along the main thoroughfare and throughout parking areas exacerbate collisions. This adds costs to the community in terms of staff time for police, fire and ambulance service, traffic congestion, and damage to personal property. Route 120, from downtown Lebanon to Hanover, is already experiencing similar challenges as it develops, and efforts are needed now to avert the creation of the traffic prob-

key points | vision & purpose



- Support regional growth and improve mobility, quality of life and neighborhood character through provision of a balanced, integrated multi-modal transportation system.
- Promote compact, mixed-use development that will increase the efficiency of the City's transportation network.
- Reduce the City's carbon footprint, decrease traffic congestion and promote healthier lifestyles by increasing transit use, walking and bicycling.

key points | issues & priorities



- Promote a more compact land use pattern that can be efficiently served by a multi-modal transportation system.
- Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.
- Establish and protect the City's green infrastructure including trails, greenways and riparian corridors that serve as non-motorized transportation connections.
- Promote active living, biking and walking as part of the daily routine, which provides dramatic improvements in public health.

key points | existing conditions & trends



- Lebanon's location at the intersection of the region's major transportation routes contributes greatly to the City's economic vitality and quality of life.
- Traffic volumes and congestion have increased on major highways in the City, while Lebanon's rural roads retain much of their scenic character.
- Bridges are essential to the City's transportation network and the regional economy, but are vulnerable to damage from storms or other disasters, as well as to degradation due to age and limited maintenance.
- There is a network of sidewalks that allows residents to walk within Lebanon's two core areas, but there is limited connectivity between them, as well as very limited or inadequate facilities within other major transportation corridors for pedestrians and bicyclists.
- Advance Transit provides regular scheduled service in the City and region, and is primarily structured to serve employees and shoppers with destinations in the Lebanon-Hanover-Hartford employment center.
- A short segment of rail line within the City has recently been reactivated for commercial freight traffic, while the remainder of the corridor provides valuable recreation and bike/pedestrian infrastructure as the Northern Rail Trail.
- The City of Lebanon owns and operates an airport for general and commercial aviation with service to selected major cities in the Northeast.
- The core area of downtown Lebanon is well served by parking facilities designed around the existing pedestrian-oriented village center, while additional parking is needed for the West Lebanon Central Business District.
- Coordinated efforts by the region's employers, local government, public entities and non-profits continue to lessen travel demand rather than create additional infrastructure to support more single occupant vehicles.

lems evident along Route 12A. A more compact, mixed-use development pattern would be less auto-dependent, allowing people to safely walk or bike between destinations and increasing the efficiency of public transit.

9|B-2

Transportation and Economic Development

Sustainable economic development can be facilitated, supported and coordinated by a well-executed, balanced transportation plan that reduces the resources required for businesses to succeed (e.g. less required parking, shorter length of utility infrastructure and more users per increment defraying cost, etc.). Creative economy and quality of life are also supported by effective coordination of transportation and economy through facilitating varied living styles and enabling viable choices for travel. Quality and diversity of employment opportunities abound when the cost to access places of work diminish to a point where those with economic challenges can have affordable access to workplaces and shopping. More effective coordination of transportation and economic development is needed to provide those living and/or working in the City access to viable transportation choices for their journey between home and work and to other destinations in the City and region.

9|B-3

Transportation and the Environment

The connection between transportation and the environment is often known as "green infrastructure". Green infrastructure includes trails, greenways, and riparian corridors that can constitute key transportation connections for non-motorized modes in less built-up areas and a means of bringing more of the natural environment into built-up areas. Advantages go beyond transportation; green infrastructure corridors can provide great benefits for air pollution control and stormwater management.

9|B-4

Transportation and Health

Active living has come to mean biking and walking as part of the daily routine which has dramatic improvements in public health. By having more pleasant and more convenient ways to walk and bike as a part of daily life, people tend to choose walking and biking in greater numbers.

9|C

Existing Conditions & Trends

9|C-1

Transportation Network

The intersection of Interstates 89 and 91 in nearby White River Junction, Vermont and the unique and desirable geography of the Upper Valley create conditions for an ideal transportation network. US Routes 4 and 5 and NH Routes 12A, 10 and 120 further improve the City's accessibility from surrounding towns, facilitating traffic flow to the employment centers of Hartford, Lebanon and Hanover. Lebanon's Airport, the Concord-White River rail corridor, and transit service all diversify the transportation system. This system has contributed greatly to Lebanon's and the Upper Valley's economic vitality and quality of life. At the same time, growth in traffic and congestion has been one of the major by-products of the economic expansion experienced in the City and region in recent decades.

Increasingly, the de-centralized nature of the housing market has contributed to longer commutes for Upper Valley workers. This dispersed residential pattern is difficult for transit or ride-share to serve effectively, so like most rural areas, there is a heavy reliance on automobile use. This regional land use pattern has dramatic impacts upon the highways and bridges in the City of Lebanon, travel time for commuters, the quality of the environment, the safety and character of neighborhoods, and the cost of municipal services.

9 | C-2 Roads

9 | C-2a **Inventory.** The state maintained highway system consists of four classes: Class I, the primary state system; Class II, the secondary state system; Class III, State recreational roads; and Class IIIa, boating access roads. The municipally maintained highway system consists of three classes: Class IV, urban compact section highways; Class V, town or City roads and streets; and Class VI, all other public ways including roads subject to gates and bars.

9 | C-2b **Roads and Land Use.** Streets and roads serve many functions. First, they act as corridors for conveyance of people, either walking, biking, in transit or in cars. They also serve as corridors for utilities, stormwater management and urban green areas with tree shading and landscaping. They are also public spaces encouraging interaction between neighbors. They facilitate access to buildings and different land uses. They can also communicate with travelers, telling them that they are in a special place and how they are expected to behave while there with signage and landscape cues. Roadway improvement projects, zoning district boundaries, and individual subdivision, zoning, site plan, driveway permit and building permit applications, should be undertaken so that roads remain appropriate to the abutting properties and compatible with adjacent land uses. Care should also be taken when laying out new roads so that the new infrastructure fits the intended land use and vice versa.

9 | C-2c **Traffic Safety and Congestion.** Traffic volumes have greatly increased on the major highways in Lebanon and can be expected to continue to grow along with the Upper Valley's continued economic growth. Traffic congestion at certain key locations, particularly Route 120 commuter traffic and Route 12A shopping traffic, is not likely to improve substantially without a more comprehensive investigation of managing demand and network-wide improvements.

Traffic congestion is a problem along many of the major highways throughout the City, such as Route 12A, Route 120 and Route 4. Congestion on Route 12A, for instance, has impacts that go beyond delays for shoppers, including reduced mobility and increased emergency response times for residents of Plainfield.

When traffic congestion reaches a saturation point, usually during peak hours, motorists seek alternative routes, often through residential neighborhoods, and/or become less safety conscious. Congestion also exacerbates the problem of through-traffic trucking on local roads. As a result of the weight limits on Interstate 91 in Vermont, many heavy trucks come through downtown West Lebanon.

Speeding can also arise from road facilities that are not designed appropriately for the context. Wide roads in residential neighborhoods are typical examples of this. When access is too cluttered and speeds are too high, this can also lead to safety problems and accidents, as witnessed on Route 12A.

Redundancy (the availability of multiple routes for travel from point A to point B) is desirable to reduce congestion and to provide improved access to major destinations such as Dartmouth Hitchcock Medical Center.

Road Class	Miles
Interstate	23.6
State Maintained	19.9
City Access - Public Works Road	5.3
State Road - City Maintained	8.4
Private Business Access	6.7
Class V	86.0
Class VI (non-maintained)	9.0
Private Road	12.0

lebanon road mileage by class



old pine tree cemetery road

9|C-2d **Scenic Roads and Rural Character.** Lebanon has the following designated scenic roads:

- Stevens Road and Sunset Rock Road (1989)
- Eastman Hill (1990)
- Poverty Lane, Slayton Hill and Great Brook Road (1993)
- Old Pine Tree Cemetery Road (2003)

Preserving the historic nature of these roadways helps to sustain the rural feel of the community. The narrow, gently curving designs, stone walls, and surrounding vegetation evoke rural and historic character. A visually pleasing environment makes a significant contribution to a community's overall quality of life. The erosion of the visual character of a community can have not only psychological impacts, but also very real economic impacts through the loss of tourism and an inability to market the community to prospective businesses and residents. As with other environmental impacts, visual degradation can happen incrementally, slowly changing the character of a community.

9|C-3 **Bridges**

Bridges are essential elements of the City's transportation network; they often present the weakest link in that network and often are more complicated to build or maintain than other parts of the thoroughfare. Many structures are in various states of disrepair, having greater exposure to the elements and greater cost to repair. The location of bridges within the floodway also presents a potential safety hazard as it may isolate portions of the community if washed out in a flood event, and may severely limit emergency vehicle access. There are four state-owned and two city-owned bridges in Lebanon that appear on the New Hampshire Department of Transportation's Red List. Bridges on the Red List require interim inspections due to known deficiencies, poor conditions, weight restriction or type of construction.

In the bi-state Upper Valley economy, the two Connecticut River crossings are essential to the City as links between the Lebanon and Hartford, VT employment centers and residential areas, as well as for emergency vehicle access. The regular maintenance of these structures is paramount for the safety and economic well being of the City and its residents. In addition, pedestrian and bicycle-related improvements need to be incorporated into regular maintenance work and major alterations to the City's bridges.

9|C-4 **Pedestrian and Bicycle Facilities**

A network of sidewalks allows residents to walk within Lebanon's two core areas, but there is limited connectivity between them, as well as very limited or inadequate facilities along the Route 12A and Route 120 corridors. The compilation of a complete sidewalk inventory of the City has been undertaken, and will be a component of an overall pedestrian/bikeway plan in accordance with the City's pursuit of a multi-modal transportation system.

The Northern Rail Trail provides excellent recreational and transportation access for bicycles and pedestrians from downtown Lebanon to Enfield and beyond. The extension of the Rail Trail to connect with West Lebanon would be extremely beneficial for improved access for everyone, as well as making the Miracle Mile and West

Lebanon shopping districts accessible by bicycle, and should be actively pursued. The Mascoma River Greenway Project aims to make this connection whether or not the railway can be used as a base.

For cyclists, there are available five-foot or wider shoulders in numerous locations throughout Lebanon; however, numerous inconsistencies exist and many areas have no shoulders at all, which does not allow cyclists safe continuous access throughout the City. In addition, many bridges, such as the US Route 4 Bridge over the Connecticut River between West Lebanon and White River Junction, are quite narrow and pose a significant hazard for cyclists as they compete for access with cars and trucks. Other obstacles such as on-street drainage grates and vertical curbs can pose a safety hazard to cyclists and limit accessibility for anyone but the most confident cyclists.

The Lebanon Pedestrian and Bicyclist Advisory Committee (LPBAC) was created in 1995 with a charge to make the City more walkable and bikable by facilitating, enhancing, and encouraging safe pedestrian and bicycle travel and connectivity among the related infrastructure. LPBAC has completed an interim report and master plan for pedestrian and bicycle facilities. The New Hampshire Department of Transportation provides a variety of resources supporting pedestrian/bike infrastructure, including managing the Transportation Enhancement funding program, which is geared towards bicycling and pedestrian improvements.

The “Blueprint for Community Trails” (2007) report summarizes a vision for a citywide bicycle- and pedestrian-trail network with connections to the surrounding towns of Hanover, Enfield, Plainfield, and Hartford. Based on a public workshop in March 2006, that vision will need coordination and prioritization in the larger context of the updated Lebanon Master Plan (2011), including review by related City boards/committees and staff.

9 | C-5

Public Transit

Advance Transit (AT) is the primary fixed-route transit provider in the Upper Valley, providing regular scheduled bus service to the core Lebanon/Hanover/White River Junction area in addition to Enfield, Canaan, Norwich, Wilder and Hartford. Additionally, AT provides shuttle service for Dartmouth Hitchcock Medical Center and Dartmouth College.

Advance Transit works closely with communities, business and industry to develop and maintain transportation options for Upper Valley residents and employees. AT primarily operates around the denser populated core of the Upper Valley. However, many of the individuals that are transit-dependent (elderly, disabled, and lower-income) are located further away from the core on the outer reaches of the service area. This makes service economically difficult for the transit provider and logistically difficult for users. It also increases the demand on an already short supply of park and ride lots.

There are other transportation providers or public-private partnerships operating in the Upper Valley whose services are primarily for the elderly or disabled, as well as for linkages to area employers from other regions. Grafton County Senior Citizens Council and United Developmental Services provide para-transit (door-to-door) service to the elderly and disabled in the Lebanon area. Stagecoach Transportation Services provides similar service in neighboring Vermont communities and Community Transportation Services does the same for Sullivan County.



route 10 near sachem village, west lebanon



downtown lebanon transit stop

9|C-6 Rail

Lebanon is home to a portion of the former Boston and Maine freight rail line. Except for approximately 2 miles from the Connecticut River easterly, commercial freight traffic along this White River Junction, VT to Concord, NH railroad line has not been active for more than 30 years. Part of this line now provides valuable recreation and bike/pedestrian infrastructure as the Northern Rail Trail.

There is currently no passenger rail service within the community although it is a future possibility. The nearest passenger rail line, provided by Amtrak, runs through White River Junction, Vermont, providing north/south connections between St. Albans, Vermont and New London, Connecticut along the Central Vermont rail line.

There is currently an investigation into the development of high-speed rail between Boston and Montreal. Phase One of the study is complete, and indicates that potential ridership is high enough to warrant further study. The next phase will evaluate the costs and benefits of the service and may be of interest to Lebanon, as a portion of the corridor could be within the City. Additionally, Lebanon has recently joined the New England Regional Rail Coalition, an advocacy group for enhanced rail service in New England.

9|C-7 Airport

The City of Lebanon owns and operates an airport for general and commercial aviation with scheduled daily service to Boston and White Plains, New York. The facility includes an air traffic control tower, two runways and hangars.

A 2008 survey indicated that general aviation, particularly corporate jet activity is the most critical economic component of the airport. The airport accommodates regional and national corporate aviation needs, providing access to Dartmouth Hitchcock Medical Center (DHMC) and Dartmouth College, as well as other businesses and institutions.

“Fly Lebanon,” a partnership between the City of Lebanon and the Greater Lebanon Area Chamber of Commerce, has been working to promote incentives for increased passenger use of the airport. In recent years, several factors have challenged commercial air service to and from Lebanon, including the airport’s small size and population base; competition from larger airports with low-fare carriers in Manchester, NH and Burlington, VT and restructuring of the airline industry.

9|C-8 Parking

Parking is an essential component of transportation, but also of economic development as it contributes to the access of business establishments. However, the need for parking is often dependent upon the proximity of differing land uses, from residential to commercial.

The core area of downtown Lebanon is somewhat well served by parking facilities designed around the existing pedestrian-oriented village center. In this area, people may park on the street or in lots located behind buildings in the downtown location and walk from one shop to another. A cluster of key services in the Lebanon Central Business District, such as the post Office and library, are located within very close proximity making this an attractive and efficient setting. These existing mixed-use areas should be encouraged, expanded and replicated

in other areas. The same is not true for West Lebanon. Here, while there is some on-street parking, there is not enough for the visitors to the village.

9 | C-9 Transportation Demand Management

The Upper Valley Transportation Management Association (UVTMA) is a current initiative by employers and public entities to lessen travel demand rather than create infrastructure to support more single occupant vehicles. Transportation demand management (TDM) consists of a broad range of strategies that are intended to reduce and reshape demands on transportation infrastructure including employer flextime and staggered shifts, parking management, commuter incentives, and bike and pedestrian improvements.

Upper Valley Ride-share (UVRS), provided by Advance Transit, maintains a database of area commuters carpooling and offers an online 'ride board' to facilitate carpooling and ride sharing. There are no formal park and ride lots in Lebanon and few with excess capacity serving the job center. Park and ride lots are integral in facilitating inter-modal connections and supporting transit use. Large new lots in fast growing areas such as Grantham and Enfield enable additional car- and van-pooling. Major employers are also exploring this concept by developing satellite parking lots for employees and serving them with bus services in order to limit the development of parking on valuable land.

In 2009, federal funds totaling \$500,000 were secured for exploration of an inter-modal transit facility to serve the Upper Valley. The concept included parking for several hundred vehicles, whose drivers could then board buses and/or other forms of transportation to go to work and elsewhere, including destinations outside the region. Although the effort did not result in any infrastructure improvements, it highlighted the need to continue exploring enhancements to transportation infrastructure within the region.

9 | D **Future Challenges & Opportunities**

9 | D-1 Alternative Land Use and Traffic Approaches

Traditionally, Lebanon has viewed its transportation system as consisting of a roadway network emphasizing automobiles, with some alternative transportation facilities. The future challenge is to recognize the connections between key places in Lebanon as a web of interconnecting options that reinforce and sustain one another.

For people to choose alternative transportation over use of their automobiles, there must be viable alternatives to driving, such as the following:

- Walking routes must be safe, direct, and attractive.
- Homes must be close to workplaces and services.
- Land uses and streetscapes must be human-scaled, balancing pedestrian amenities with automobile access.
- Public streets must support a balanced variety of uses, with the balance being different for different streets based on their function.

key points | future challenges & opportunities



- Lebanon needs a safe, interconnected, multi-modal transportation network that links residential areas to commercial, educational, recreational and cultural centers.
- There needs to be ongoing consideration and regional discussion concerning how to mitigate traffic congestion within Lebanon's main travel corridors. The City should take steps to protect and enhance the character of its scenic highway corridors.
- The City should encourage and promote the development of interconnected networks of sidewalks, bicycle routes and paths, and other recreational trails that facilitate better transportation throughout the community.
- The City should seek to make improvements to better support mass transportation and should continue to advocate for expanded transit service within the region.
- The City should carefully weigh the potential economic, environmental and quality of life benefits and costs that restoring major rail lines through the region would have and advocate for the community's best interest with the railroad and state.
- Parking should be planned with consideration for the overall goal of encouraging a multi-modal transportation system.
- Lebanon needs more effective transportation management strategies, in addition to improved facilities, to reach its goals of a better performing transportation system.

- Transit service must be convenient, reliable, and timely.
- Bicycle routes must be safe and destinations must have convenient and secure parking for bicycles.
- Ride-share opportunities and incentives not to drive must be provided.

Development has been oriented to the use of automobiles at the expense of other transportation modes. The goal should be to create developments that include a safe and ample multi-modal transportation network linking residential areas to commercial, educational, recreational, and cultural centers. This network would include limiting roadway widening projects in favor of safe and attractive facilities for pedestrians, bicycles and transit. The network must be complete for all mode paths; sidewalks that just end, bus stops in drainage ditches, and bicycles crossing high-speed thoroughfares are all examples of incomplete mode paths. Complete streets are a tool to help ensure a complete mode path in the network, creating a way for all modes that use the road segment to share the right-of-way safely and efficiently.

Future transportation facilities that require consideration include inter-modal stations, rapid-transit stations and stops, green infrastructure, better gateways and transitions between changing corridor demands and other components necessary to complete trips. They may also entail different modes than those currently served by Lebanon. Examples of these may include river travel and horse trails, as well as a connector to I-91 that includes crossing the Connecticut River by gondola, tram or monorail. Inter-modal stations may offer bike repair and storage facilities or easier means to put bikes on transit. They may offer ride-share, car-share or smart-carpool facilities. Stations and stops may promote more rapid transit by having dedicated lanes, at-level entry for quick loading and unloading, and easy transfers between routes and modes.

9 | D-2 Roads

9 | D-2a **Traffic Congestion.** Current projects under construction by NHDOT to address traffic congestion along Route 12A include raising and lengthening of the Exit 20 bridge overpass to allow for more lanes underneath and the widening of Route 12A between Airport Road and the K-Mart plaza.

Alternatives to improve access to DHMC were investigated in the 1988 Upper Valley Transportation Study, which predated DHMC's move to Lebanon. The study included a connector road from DHMC to Route 10 or I-91. This alternative was projected at that time to significantly reduce traffic at existing river crossings. However, a connector only to Route 10 will more than likely not reduce traffic through the West Lebanon Central Business District or downtown Hanover.

Access management, telecommuting, ride-sharing, flexible work schedules, transit and other alternative transportation modes are all practices that can help mitigate traffic congestion. In addition, zoning that encourages mixed-use development can help reduce the distance of a commute or lunch-hour trips. There should continue to be thoughtful consideration and regional discussion concerning how to mitigate traffic congestion within the main travel corridors. Future decision-making relative to land use, site development, and infrastructure improvements will need to include new approaches to mitigate future traffic and its demands on the City's transportation system. It will be difficult to solve Lebanon's future transportation issues in isolation or with strict engineering or road building solutions. It will require a well-planned and integrated transportation system that supports all modes of transportation.

9 | D-2b **Scenic Roads and Gateways.** Many of Lebanon's highways are still scenic and should remain so. Effort should continue to support the City's Scenic Roads Ordinance, and to encourage citizen input via petition identifying and designating more local scenic roads. Care should be taken when the City works on scenic roads, and stone walls and significant trees along these roads should be preserved. While balancing public safety concerns with rural design can be challenging, it is important to design standards for scenic roads that compromise neither safety nor local character. The City should begin to set design guidelines for the visual landscape.

Scenic roads will also be protected by directing commercial and residential development towards already developed areas. When development does occur along the City's scenic corridors, it should be appropriately sited and screened so as to reduce its negative visual impact. Green buffers, conservation design, and landscaping in harmony with the natural and historic features of the landscape, all contribute to preserving scenic values. A flexible scenic corridors overlay district would help protect the City's character from inappropriate development and land uses.

The City should also help maintain the scenic appearance of its entry ways by creating landscaping standards for those portions of entry corridors not already built up, at I-89 and Routes 120, 10, 4 and 12A. Using gateways to help guide developments away from rural areas towards existing built-up areas will benefit the downtown economies, in addition to maintaining scenic character. The City should strive to improve the appearance of more developed corridors, as well, by avoiding haphazard, unsightly, or inadequate landscaping that does not protect and conform to the natural features of the area.

Better gateways may add aesthetic value to Lebanon, but also could better communicate travel direction, routes and behavior to travelers. Similarly, better transitions between corridors may improve mode flow and safety and again communicate changes in travel behavior like speed changes (for all modes) and changes in mode priority, e.g. from a bike boulevard to a pedestrian greenway (where both modes are allowed, but one has priority). Green infrastructure can be enhanced with more trails and greenways and riparian ways adding both to connections for travelers and enhancing Lebanon's environment.

9 | D-3 **Pedestrian and Bicycle Facilities**

There continues to be high public interest in the development of pedestrian and bicycle infrastructure, as well as many practical reasons to prioritize concrete actions on improving these modes of the City's overall transportation plan, including aesthetic, environmental and public health benefits. As such, the City should encourage and promote the development of interconnected networks of sidewalks, bicycle routes and paths, and recreational trails that facilitate better transportation throughout the community, especially to meet the needs of the young, elderly and other populations who do not drive. This initiative is especially critical to ensure that the City is in compliance with the Americans with Disabilities Act (ADA).

Automobile-centered growth has generally resulted in diminished bicycle and pedestrian accessibility. All transportation needs should be addressed in all roadway projects so that that attractive and safe facilities are available throughout the community, such as complete streets.



route 120 northward from exit 18

9 | D-4 Transit

Ridership on all Advance Transit (AT) routes has increased dramatically in recent years. Improved conditions, however, such as a network of park-and-ride lots, would better support mass transportation. For example, there are areas along the Route 120 corridor that do not have park-and-ride lots for commuters wishing to use bus service. A good location for such lot could be at Exit 18 of I-89. A new transit route linking the Upper Valley with the Precision Valley via Route 120 is also needed.

Pedestrian connections between employers, residents, and bus stops are minimal throughout the area, and bus stops are often inhospitable, provide no shelter, and are not plowed in the winter. Financial support for Advance Transit operations is not secure and may be limiting the expansion of service in several key areas. Linear “strip development” in Lebanon, such as that along Route 12A, is particularly difficult for transit to serve. Buses need to compete with other passenger vehicles for roadway space, causing delays and scheduling difficulties. Likewise, isolated industrial parks pose problems reaching and servicing employees. On a site-specific level, the placement of parking in front of buildings and other design factors contributes towards a heavy reliance on vehicular travel and is a disinvestment in transit service. The City should work in cooperation with Advance Transit to address these issues, as transit is a key element in the multi-modal approach.

9 | D-5 Rail

Many of the issues affecting rail transportation, both passenger and freight, are beyond local control. However, the City should consider the potential economic and environmental benefits that restoring major rail lines through the region could encourage. For example, more rail use could alleviate road congestion and costs related to road maintenance. On the other hand, the revival of rail transportation could negatively affect residential neighborhoods that have grown accustomed to cleaner, quieter surroundings since the decline of the railroad. The City’s continued involvement in decisions about any rail line is critical, as the local impact will be significant and there are many competing interests.

9 | D-6 Parking

Parking shall be planned with consideration for the overall goal of encouraging a multi-modal transportation system. Needs of pedestrians, bicycles and transit should be balanced with the needs of individual automobile users as well as aesthetic considerations.

Bike parking and stations also need to be provided if bike travel is to become truly viable. Facilities need to be provided at major destinations and bus stops to allow bicycles riders to access places on their bikes and extend their range on transit facilities.

9 | D-7 Management Strategies

9 | D-7a **Access Management.** The solution to preserving investment in highways and improving safety is to not always increase roadway capacity but to manage access. Access management uses a variety of techniques to minimize conflicting traffic movements and optimize roadway capacity and system efficiency. It involves limiting overly abundant, poorly designed access points and driveways. Often access management can be

improved by focusing on site improvements, such as defined entry ways and exits, shared driveways, and connections between adjacent subdivisions. Effective access management:¹

- Reduces crashes by as much as 50%.
- Increases capacity 23-45%.
- Extends life of the highway
- Treats applications for access permits consistently.
- Protects investment in abutting property.
- Reduces travel time and delay by 40-60%.
- Decreases fuel consumption by 35%.
- Reduces vehicular emissions.
- Reduces transportation costs.

Zoning can help by coordinating anticipated traffic volumes and speeds with frontage, lot size, curb cut, and signage requirements and requiring development that concentrates growth and mixed land uses in nodes to minimize transportation demand in key highway corridors.

Common access management techniques include:

- **Medians.** Crash rates on major roadways with jersey barriers or solid (non-traversable) medians have been found to be substantially lower than undivided roadways or roadways with a continuous two-way left turn lane (TWLTL), such as Route 12A. Safety is also reduced where median openings are too close.
- **Auxiliary Lanes.** Left and right turn bays minimize the conflict between turning vehicles and through traffic.
- **Signalized Intersection Spacing.** Long, uniform signalized intersection spacing facilitates the use of timing plans that can respond to peak and off-peak traffic conditions.
- **Driveway Location and Design.** Driveways should be spaced a minimum distance apart, the distance depending on traffic speeds and the road's functional classification.
- **Corner Clearance.** Corner clearance is the distance from an intersection to the nearest access connection. Appropriate corner clearance standards preserve good traffic operations.
- **Joint and Cross Access.** This is the requirement to consolidate driveways serving more than one property and providing circulation between adjacent parcels. This will help separate driveway spacing as well.
- **Reverse Frontage.** Lots abutting the thoroughfare should not be allowed direct access to the thoroughfare. Instead an interior street should be required, which would eliminate conflicts between high-speed traffic and lower entrance/exit traffic. Access to the thoroughfare is provided at locations that can be designed safely.

¹ Access Management, Location and Design; US Department of Transportation, Federal Highway Administration, National Highway institute, April 2000.

Route 12A in Lebanon is undoubtedly the best example of an area that could benefit from extensive and well-planned access management measures. The Route 12A problems include poorly coordinated on-site circulation, including excessive curb cuts, which contributes to multiple traffic conflicts, causes an increase in traffic congestion, and reduces capacity and pedestrian safety. Redundant access points should be evaluated for possible closure in the context of site plan review for future developments. Already existing redundant access points should be closed. More attention to access management will improve Routes 10 and 4 as well.

- 9 | D-7b **Concurrency Management.** Concurrency management may also be beneficial to Lebanon. This technique regulates traffic congestion by identifying tolerable levels of congestion, which could be used as a basis for development permitting and municipal capital investments. This is important because often the increased costs of providing those additional services and infrastructure improvements are not fully realized by the increased tax revenues generated by those new developments. The City must balance an adequate and equitable transportation system for its residents and businesses with cost of constructing and maintaining such a system.
- 9 | D-7c **Traffic Calming.** Thoroughfare design can have a dramatic impact on driver behavior. Design elements, often referred to as traffic calming, encourage drivers to slow down and aesthetically enhance a corridor, both of which are important to pedestrian and bicycle safety. Lebanon has several areas that may benefit from traffic calming, most notably, the traffic circulation around Colburn Park. There have been pedestrian fatalities in this area in recent years. The multiple travel lanes with no lane markings, high vehicular speeds, diagonal parking, exceedingly long crosswalks with no islands-of-refuge, and high vehicular counts combine with the many pedestrians crossing the roadway to make a dangerous area for pedestrians.

Traffic calming techniques can be used to slow down and control traffic on streets where it is necessary for motorized traffic, pedestrians and bicyclists to coexist. Traffic calming measures include:

- **Narrowing Streets.** Wide streets often encourage faster speeds. Extending curbs, eliminating multiple lanes, and adding bicycle lanes can help reduce speeds.
- **Breaking Up Straightaways.** Straightaways on roads encourage speeding. Making physical alterations such as speed humps, speed tables, rumble strips, chicanes, and roundabouts discourage high speeds.
- **Redesigning Intersections.** Realign and redesign intersections to be more pedestrian friendly by adding “neckdowns” (a curb and esplanade extension toward the center of the roadway that narrows a travel lane or street causing a reduction in speed) and changing signal times to add more time for walking across streets.

Mt. Support Road, Heater Road and Mascoma Street are among roads that could benefit from traffic calming measures. It is essential that the design and implementation of traffic calming measures be based on a comprehensive review of the area roadways to ensure that their intended purpose is met and that they are appropriate for the roadway and existing conditions.

Gould Road, Dulac Street and Maple Street provide success stories where speed tables have been installed and seem to be working well to calm traffic.

- 9 | D-7d **Complete Streets and Complete Networks.** The City strives toward a transportation policy and development plan that is based on the Complete Networks and Complete Streets model, which includes safe access for all users (including pedestrians, bicyclists, motorists and transit riders).

Complete networks promote continuous connections of all places by all modes supported by the City. If one were to travel to a given destination via bicycle, the traveler should be able to ride on comfortable and safe routes the entire way to get to that destination and have appropriate facilities for storing the bicycle once there. Similar considerations are necessary for the other modes chosen to serve Lebanon, ensuring a viable “complete trip” for the entire length of the trip. If a traveler cannot walk to a convenient bus stop or one cannot get into the building from the parking lot, the mode is not viable. If a given route for a given mode is too circuitous, again the mode becomes less viable, less “complete”.

Complete streets are designed for all potential right-of-way users, integrating safely all mode routes in an efficient use of the street corridor. This does not mean that all modes use all street segments. It would be prohibitively expensive and inefficient to accommodate public transit on all corridors, but all viable modes should have a route available and those routes should all safely share the right-of-way on the streets where they co-locate. Finally the facilities selected for the modes on a given corridor should be appropriate to local context and needs, and should adhere to community vision, for instance being of the proper scale and using signage consistent with that of the neighborhood.

Previous planning initiatives and zoning requirements once favored vast paved areas built for maximum demand that are often under used. Changes to the zoning ordinance in 2008 promoted the current goal of optimizing land use and encouraging complete street downtown cores that are bike and pedestrian friendly. This change in goals and strategy should be fully supported to create a multi-modal transportation system. Parking must be optimized by coordinating uses and facilities to encourage a multi-modal system. The needs of pedestrians, bicyclists, transit, and aesthetic considerations should be balanced with those of automobile users, especially in central business district areas.

- 9 | D-7e **Performance Measures.** Another future challenge is to transition from simply measuring and monitoring facets of transportation, e.g. volume, to understanding the net desired performance of transportation in achieving more sustainable and satisfying outcomes, e.g. more volume per incremental investment or per desired destination. Street metrics must include other considerations than level of service and automobile mobility in order to provide better performing, better integrated modal facilities and ensure the safe interaction of the multiple modes on a given corridor. To rise to these challenges, Lebanon must examine its transportation management strategies as well as its facilities to arrive at this higher performing network fabric connecting the places that Lebanon values.
- 9 | D-7f **Strategic Transportation Funding.** To assure adequate, efficient, and effective transportation development, as outlined in this Master Plan, the City of Lebanon shall actively pursue various forms of funding. Funds gathered from impact fees, grants, and other sources shall be used to pay for transportation studies and uses within the City, encompassing a regional scope, including but not limited to:
- Periodic corridor studies
 - Multi-modal center(s) and related system(s)

- Traffic flow and improvement studies
- Freight movement studies and programs
- Mass transit, local and regional bus transit
- Carpools and park-and-rides
- Rail feasibility studies and programs
- Bicycle and pedestrian network and infrastructure studies and uses

Application of funds may include, but is not limited to:

- Upgrading and replacement of outmoded and deteriorating existing transportation infrastructure
- Developing and constructing a multi-modal transportation center(s) and system(s)
- Developing pedestrian and bicycle access to existing retail, employment, and other job destinations
- Creating incentives for alternative methods of transportation, including public transit, carpools, walking & biking
- Traffic calming techniques
- Creating within Lebanon the concept of “Complete Streets”

The City shall actively pursue federal, state, and regional monies for projects identified in this Master Plan. The City shall also actively pursue public and private grants to achieve the same objectives as listed above, including the use of public/private partnerships.

Outcomes & Strategies

OUTCOME 1 Promote a more compact land use pattern that can be efficiently served by a multi-modal transportation system.

STRATEGIES

- 1 Encourage developments that are easily served by public transit.
- 2 Assist, train and partner with developers to create transit oriented development with front walks along streets, garages at the rear of properties, front porches, mixed land uses and sidewalks.
- 3 Address parking needs to ensure adequate but not excessive parking for development.
- 4 Ensure adequate on and off-site traffic circulation for commercial development.

ACTIONS

- 1 Require transit and support facilities during subdivision and site plan review.
- 2 Develop and implement a citywide traffic plan that discourages through traffic in residential areas by using traffic calming measures.
- 3 Develop a citywide transportation master plan.
- 4 Develop a long range redevelopment plan for Route 12A, which balances environmental and transportation concerns with mixed-use development and pedestrian/bicycle movement.

OUTCOME 2 Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.

STRATEGIES

- 1 Encourage businesses and industries to provide commuter benefits.
- 2 Create local access management policies in an effort to ensure that future development and road access adhere to sound access management principles.
- 3 Manage the growth in traffic volume by promoting alternatives to vehicle trips, such as telecommuting, ride-sharing, and transit use.
- 4 Explore using remaining rail connections to move heavy loads across the Connecticut River from western New Hampshire to eastern Vermont.
- 5 Implement techniques, such as transportation demand management, as the preferred alternative to increasing highway capacity.
- 6 Work with Advance Transit to implement the recently completed bus stop feasibility study.
- 7 Establish a system of park-and-ride lots along major travel corridors, especially outside of the City.
- 8 Continue financial support of Advance Transit.
- 9 Support and promote the use of Upper Valley Ride-share.
- 10 Support transit routes to Alice Peck Day Memorial Hospital and other underserved destinations.
- 11 Continue to work with surrounding communities and the Regional Planning Commission to seek local solutions for regional transportation problems.
- 12 Continue to cooperate with the Upper Valley Transportation Management Association on transportation demand management initiatives.

ACTIONS

- 1 Pursue an access management memorandum of understanding with the New Hampshire Department of Transportation for Route 12A and Route 4, at a minimum.
- 2 Create and implement access management retrofit plans on Route 12A, Miracle Mile, and Mechanic Street in Lebanon and Routes 10 and 4 in West Lebanon.
- 3 Coordinate with state and federal transportation authorities to take action needed to ensure that the heaviest trucks and equipment continue to have access to I-89 and its bridges, as well as I-91.
- 4 Work with the New Hampshire Department of Transportation to develop a corridor plan for Route 120.
- 5 Improve facilities at urban transit stops, such as pull off areas, and assist with bus shelter construction, snow removal, and parking facilities.
- 6 Provide City employees with incentives that promote the use of public transportation.
- 7 Continue to be active on the Upper Valley Regional Planning Commission's Transportation Advisory Committee.
- 8 Continue to use pavement management systems to efficiently maintain roads and streets.
- 9 Carry out the ten year plan with the aid of the New Hampshire Department of Transportation and other possible funding sources.
- 10 Purchase hybrid vehicles using biodiesel and/or other alternative fuels for all appropriate City vehicles.

OUTCOME 2 Coordinate transportation and economic development to provide those living and/or working in the City access to viable transportation choices.

STRATEGIES

- 13 Continue to work with Hanover, the state Department of Transportation, and UVLSRPC to address congestion on Route 120 and prevent future problems as the corridor develops.
- 14 Be a leader in developing creative solutions to transportation problems, including the future use of high occupancy vehicle lanes to aid transit buses.
- 15 Support rail transit along the existing rail line from Bellows Falls and Randolph to Lebanon/Hartford/Hanover for regional commuters.

OUTCOME 3 Identify and protect the City's green infrastructure including trails, greenways and riparian corridors that serve as non-motorized transportation connections.

STRATEGIES

- 1 Cooperate with groups, such as Friends of the Northern Rail Trail and the Upper Valley Trails Alliance, to maintain and extend the existing rail trail from Lebanon to West Lebanon.

ACTIONS

- 1 Coordinate with the Planning Board, Conservation Commission, Pedestrian and Bicycle Advisory Committee and the Recreation Department to develop a trails master plan.

OUTCOME 4 Promote active living, biking and walking as part of the daily routine, which has dramatic improvements in public health.

STRATEGIES

- 1 Promote safe intersection design and bicycle, pedestrian, and transit friendly traffic signals.
- 2 Support the Pedestrian and Bicycle Advisory Committee in creating a comprehensive pedestrian and bicycle facilities plan which identifies where linkages can be made and additional infrastructure is warranted, both in and outside the City.
- 3 Provide a landscaped buffer between the sidewalk & roadway of busy & high speed streets, where feasible.
- 4 Promote improved pedestrian facilities throughout the City, including a well maintained, interconnected network of sidewalks, benches, and landscaping that provides shade for pedestrians and attractive, non-obtrusive lighting.
- 5 Promote safe pedestrian accommodations, including curb extensions where appropriate, at crosswalk locations and segregated sidewalks with landscape buffers along all major roadways.
- 6 Promote a consistent network of wide shoulders or bike lanes on rural highways for cyclists and shared use of narrower roads in urban areas with appropriate signage and road markings.
- 7 Provide dedicated bike facilities to allow cyclists to safely travel City roads, including bike lanes and cycle tracks, as well as more bike-focused facilities like multi-use paths and sharrows (shared lanes).

ACTIONS

- 1 Include five foot shoulders in all City and state bridge and road projects to provide safe bicycle and pedestrian access
- 2 Complete the Americans with Disabilities Act transition plan to ensure that public facilities meet ADA guidelines.
- 3 Develop facilities to allow for independent child mobility, such as separated bike paths.
- 4 Install bicycle racks, showers, and lockers in public spaces throughout the community.
- 5 Require developers to install bicycle racks, showers, and lockers as part of site plan approval.

APPENDIX I

WETLANDS DATA SHEETS/NHB DATACHECK LETTER



Charlotte W. Brodie
Field Naturalist

6 Green Tree Drive
South Burlington, VT 05403-6025
(802) 728-7202
Fax (866) 783-7101
cbrodie@dubois-king.com

**ENGINEERING PLANNING SURVEY
PROGRAM MANAGEMENT**

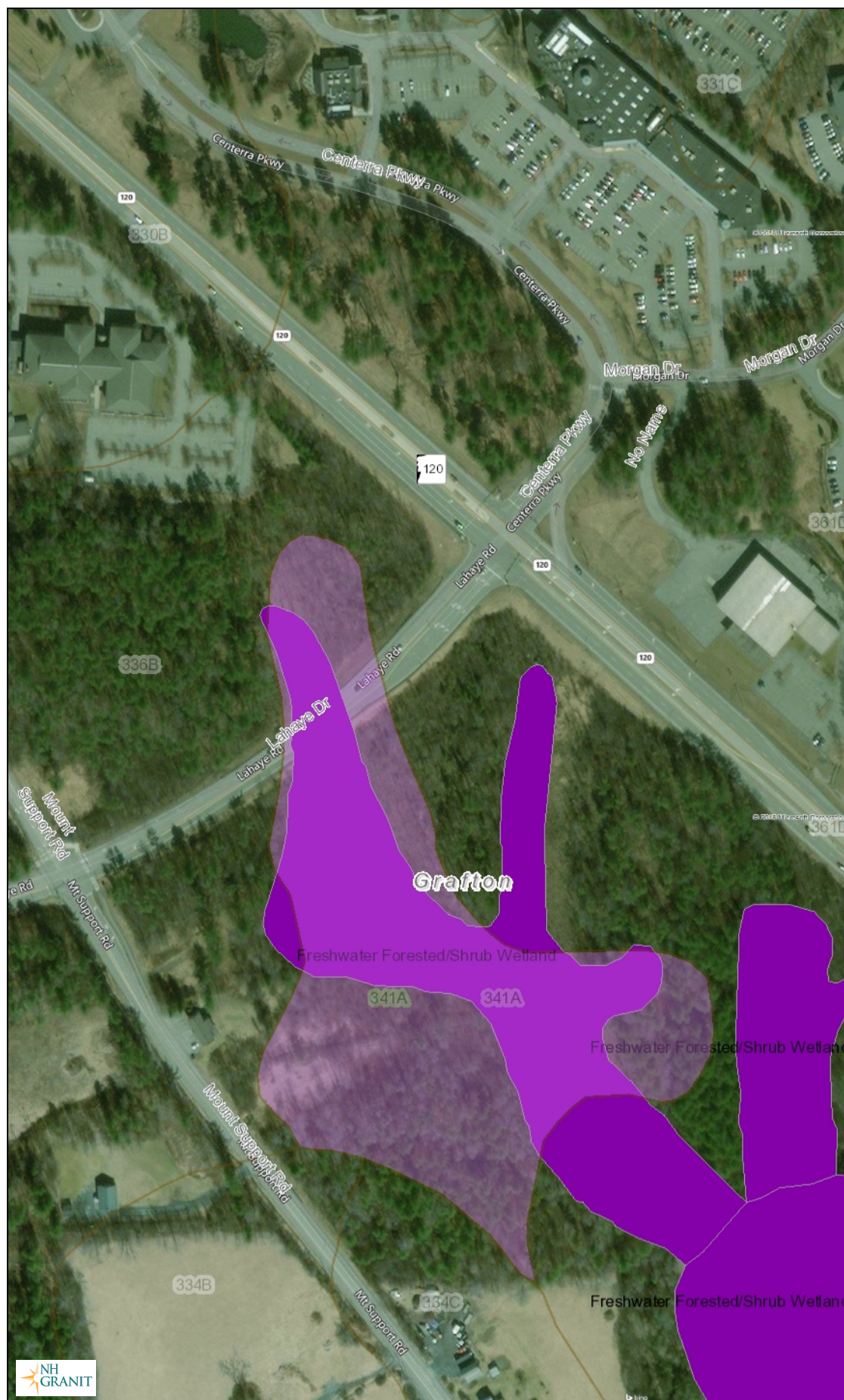
MEMORANDUM

624260F1

TO: Project File
SUBJECT: Lehay Drive Sidewalk, Wetlands Review
DATE: June 26, 2018

1. The Lehay Drive Sidewalk Study project is located along both sides of Lehay Drive between Mount Support Road and NH Rt.120 in the Town of Lebanon, as shown on the attached NH GRANIT map.
2. I visited the project area on May 10, 2017 to search for wetlands. I found wetland along essentially the entire length of both sides of the road. I delineated the wetland in accordance with the COE 1987 Wetland Delineation Manual and the COE 2012 Regional Supplement for the Northcentral and Northeast Region (transect data sheets attached). I flagged the boundaries, and recorded them using a Trimble Geo-XT GPS unit. The wetlands are shown on the attached annotated CADD drawing. Photos of the wetlands are attached.
3. The wetland is palustrine emergent (PEM) in the center portion, and PFO/SS along the upper edges. The common wetland vegetation includes cattails, soft rush, sensitive fern, reed canary grass, purple loosestrife, dark-green bulrush, meadowsweet, willow, grey birch, shadbush, alder, red-osier dogwood, buckthorn, and balsam fir. The principal valuable functions include floodflow alteration, sediment/toxicant retention, sediment/shoreline stabilization and wildlife habitat.
4. The NH Natural Heritage Bureau Data Check was accomplished. There are no known records of rare species or exemplary natural communities in the vicinity of the project (see attached NHB report).

Map by NH GRANIT



Legend

- State
- County
- City/Town
- Conservation and Public Land
- Soil Series
- Hydric Soils
- Stream Centerlines
 - Perennial Stream
 - Intermittent Stream
- Artificial Paths
- Water Bodies
 - Lake/Pond
 - Reservoir
 - Estuary
 - Swamp/Marsh
- Other Water Features
 - River
 - Spillway
 - Inundation Area
 - Dam/Weir
 - Canal/Ditch
 - Rapids
- Wetlands
 - Estuarine and Marine Deepwater
 - Estuarine and Marine Wetland
 - Freshwater Emergent Wetland
 - Freshwater Forested/Shrub Wetland
 - Freshwater Pond
 - Lake
 - Other
 - Riverine

Map Scale

1: 3,247

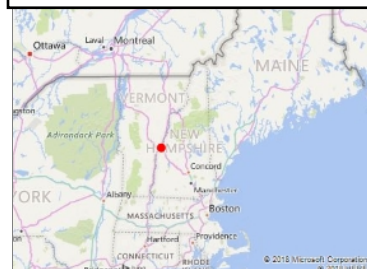
© NH GRANIT, www.granit.unh.edu

Map Generated: 5/9/2018



Notes

NH GRANIT MAP



WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lehaye Drive sidewalk City/County: Lebanon/Grafton Sampling Date: May 10, 2018
 Applicant/Owner: City of Lebanon State: NH Sampling Point: A1
 Investigator(s): Charlotte Brodie Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): concave
 Slope (%): 3 Lat: 43° 40' 23.57" Long: 72° 15' 45.59" Datum: _____
 Soil Map Unit Name: _____ NWI classification: PFO/SS/EM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)
 Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____
 Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No _____	Is the Sampled Area within a Wetland? Yes <u>X</u> No _____ If yes, optional Wetland Site ID: <u>PFO/SS/EM</u>
Hydric Soil Present? Yes <u>X</u> No _____	
Wetland Hydrology Present? Yes <u>X</u> No _____	
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply)		Secondary Indicators (minimum of two required)
<input type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> High Water Table (A2) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13) <input type="checkbox"/> Marl Deposits (B15) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
Field Observations: Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____ Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____ Saturation Present? Yes <u>X</u> No _____ Depth (inches): <u>surface</u> (includes capillary fringe)		Wetland Hydrology Present? Yes <u>X</u> No _____
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

SOIL

Sampling Point: **A1**

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R,
<input type="checkbox"/> Histic Epipedon (A2)	MLRA 149B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input checked="" type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
☐ Coast Prairie Redox (A16) (**LRR K, L, R**)
☐ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
☐ Dark Surface (S7) (**LRR K, L**)
☐ Polyvalue Below Surface (S8) (**LRR K, L**)
☐ Thin Dark Surface (S9) (**LRR K, L**)
☐ Iron-Manganese Masses (F12) (**LRR K, L, R**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
☐ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches):

Hydric Soil Present? Yes X No

Remarks:

VEGETATION – Use scientific names of plants.

 Sampling Point: A1

Tree Stratum (Plot size: <u>30' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>Quercus rubra</u>	<u>20</u>	<u>x</u>	<u>FACU</u>	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
<u>20</u> = Total Cover				
Sapling/Shrub Stratum (Plot size: <u>15' r</u>)				Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
1. <u>Rhamnus alnifolia</u>	<u>63</u>	<u>x</u>	<u>OBL</u>	
2. <u>Fraxinus pennsylvanica</u>	<u>10</u>	_____	<u>FACW</u>	
3. <u>Ulmus americana</u>	<u>10</u>	_____	<u>FACW</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
<u>83</u> = Total Cover				
Herb Stratum (Plot size: <u>5'r</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input checked="" type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Solidago gigantea</u>	<u>10</u>	<u>x</u>	<u>FACW</u>	
2. <u>Carex sp.</u>	<u>10</u>	<u>x</u>	<u>FAC or wetter</u>	
3. <u>Rhamnus alnifolia</u>	<u>10</u>	<u>x</u>	<u>OBL</u>	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
<u>30</u> = Total Cover				
Woody Vine Stratum (Plot size: _____)				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
1. _____	_____	_____	_____	
2. _____	_____	_____	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.) 				

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Lehaye Drive sidewalk City/County: Lebanon/Grafton Sampling Date: May 10, 2018
Applicant/Owner: City of Lebanon State: NH Sampling Point: A2
Investigator(s): Charlotte Brodie Section, Township, Range: _____
Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): concave
Slope (%): 3 Lat: 43° 40' 23.57" Long: 72° 15' 45.59" Datum: _____
Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes _____ No _____	Is the Sampled Area within a Wetland? Yes _____ No <u>X</u> If yes, optional Wetland Site ID: _____
Hydric Soil Present? Yes _____ No _____	
Wetland Hydrology Present? Yes _____ No _____	
Remarks: (Explain alternative procedures here or in a separate report.)	

HYDROLOGY

Wetland Hydrology Indicators:		Secondary Indicators (minimum of two required)
Primary Indicators (minimum of one is required; check all that apply)		_____ Surface Soil Cracks (B6)
_____ Surface Water (A1)	_____ Water-Stained Leaves (B9)	_____ Drainage Patterns (B10)
_____ High Water Table (A2)	_____ Aquatic Fauna (B13)	_____ Moss Trim Lines (B16)
_____ Saturation (A3)	_____ Marl Deposits (B15)	_____ Dry-Season Water Table (C2)
_____ Water Marks (B1)	_____ Hydrogen Sulfide Odor (C1)	_____ Crayfish Burrows (C8)
_____ Sediment Deposits (B2)	_____ Oxidized Rhizospheres on Living Roots (C3)	_____ Saturation Visible on Aerial Imagery (C9)
_____ Drift Deposits (B3)	_____ Presence of Reduced Iron (C4)	_____ Stunted or Stressed Plants (D1)
_____ Algal Mat or Crust (B4)	_____ Recent Iron Reduction in Tilled Soils (C6)	_____ Geomorphic Position (D2)
_____ Iron Deposits (B5)	_____ Thin Muck Surface (C7)	_____ Shallow Aquitard (D3)
_____ Inundation Visible on Aerial Imagery (B7)	_____ Other (Explain in Remarks)	_____ Microtopographic Relief (D4)
_____ Sparsely Vegetated Concave Surface (B8)		_____ FAC-Neutral Test (D5)
Field Observations:		Wetland Hydrology Present? Yes _____ No <u>X</u>
Surface Water Present? Yes _____ No <u>X</u> Depth (inches): _____		
Water Table Present? Yes _____ No <u>X</u> Depth (inches): _____		
Saturation Present? Yes _____ No <u>X</u> Depth (inches): _____ (includes capillary fringe)		
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

SOIL

Sampling Point: A2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

[illegible]

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

<input type="checkbox"/> Histosol (A1)	<input type="checkbox"/> Polyvalue Below Surface (S8) (LRR R,
<input type="checkbox"/> Histic Epipedon (A2)	MLRA 149B)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/> Thin Dark Surface (S9) (LRR R, MLRA 149B)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/> Loamy Mucky Mineral (F1) (LRR K, L)
<input type="checkbox"/> Stratified Layers (A5)	<input type="checkbox"/> Loamy Gleyed Matrix (F2)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/> Depleted Matrix (F3)
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/> Redox Dark Surface (F6)
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/> Depleted Dark Surface (F7)
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/> Redox Depressions (F8)
<input type="checkbox"/> Sandy Redox (S5)	
<input type="checkbox"/> Stripped Matrix (S6)	
<input type="checkbox"/> Dark Surface (S7) (LRR R, MLRA 149B)	

Indicators for Problematic Hydric Soils³:

☐ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
☐ Coast Prairie Redox (A16) (**LRR K, L, R**)
☐ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
☐ Dark Surface (S7) (**LRR K, L**)
☐ Polyvalue Below Surface (S8) (**LRR K, L**)
☐ Thin Dark Surface (S9) (**LRR K, L**)
☐ Iron-Manganese Masses (F12) (**LRR K, L, R**)
☐ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
☐ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
☐ Red Parent Material (TF2)
☐ Very Shallow Dark Surface (TF12)
☐ Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches):

Hydric Soil Present? Yes _____ No X

Remarks:

VEGETATION – Use scientific names of plants.

 Sampling Point: A2

Tree Stratum (Plot size: <u>30' r</u>)	Absolute % Cover	Dominant Species?	Indicator Status	
1. <u>None</u>				Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A) Total Number of Dominant Species Across All Strata: <u>1</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A/B)
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
				Prevalence Index worksheet: <div style="display: flex; justify-content: space-between;"> Total % Cover of: Multiply by: </div> OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
_____ = Total Cover				
1. <u>None</u>				
2. _____				
3. _____				
4. _____				
				Hydrophytic Vegetation Indicators: <input type="checkbox"/> Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> Dominance Test is >50% <input type="checkbox"/> Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
_____ = Total Cover				
1. <u>Poa compressa</u>	<u>86</u>	<u>x</u>	<u>UPL</u>	
2. _____				
3. _____				
4. _____				
5. _____				
6. _____				
7. _____				
8. _____				
9. _____				
10. _____				
11. _____				
12. _____				
_____ = Total Cover				Definitions of Vegetation Strata: Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/shrub – Woody plants less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vines – All woody vines greater than 3.28 ft in height.
				Hydrophytic Vegetation Present? Yes _____ No <u>X</u>
Woody Vine Stratum (Plot size: _____)				
1. _____				
2. _____				
3. _____				
4. _____				
_____ = Total Cover				
Remarks: (Include photo numbers here or on a separate sheet.)				

Lehaye Drive Sidewalk Study, Wetlands Photos, May 2018



Wetland, north side, northeast corner, facing north



Wetland, north side, SW corner, facing east



Wetland, south side, facing south



Wetland, south side, southwest corner, facing southeast



Wetland, south side, facing south



Wetland, south side, wasp nest in cattails



New Hampshire Natural Heritage Bureau

To: Charlotte Brodie
P.O. Box 1257
Williston, VT 05495

Date: 6/26/2018

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 6/26/2018
NHB File ID: NHB18-2003

Applicant: City of Lebanon

Location: Tax Map(s)/Lot(s):
Lebanon

Project Description: Add a sidewalk along one side of Lehay Drive between
Mount Support Road and NH Rt 120.

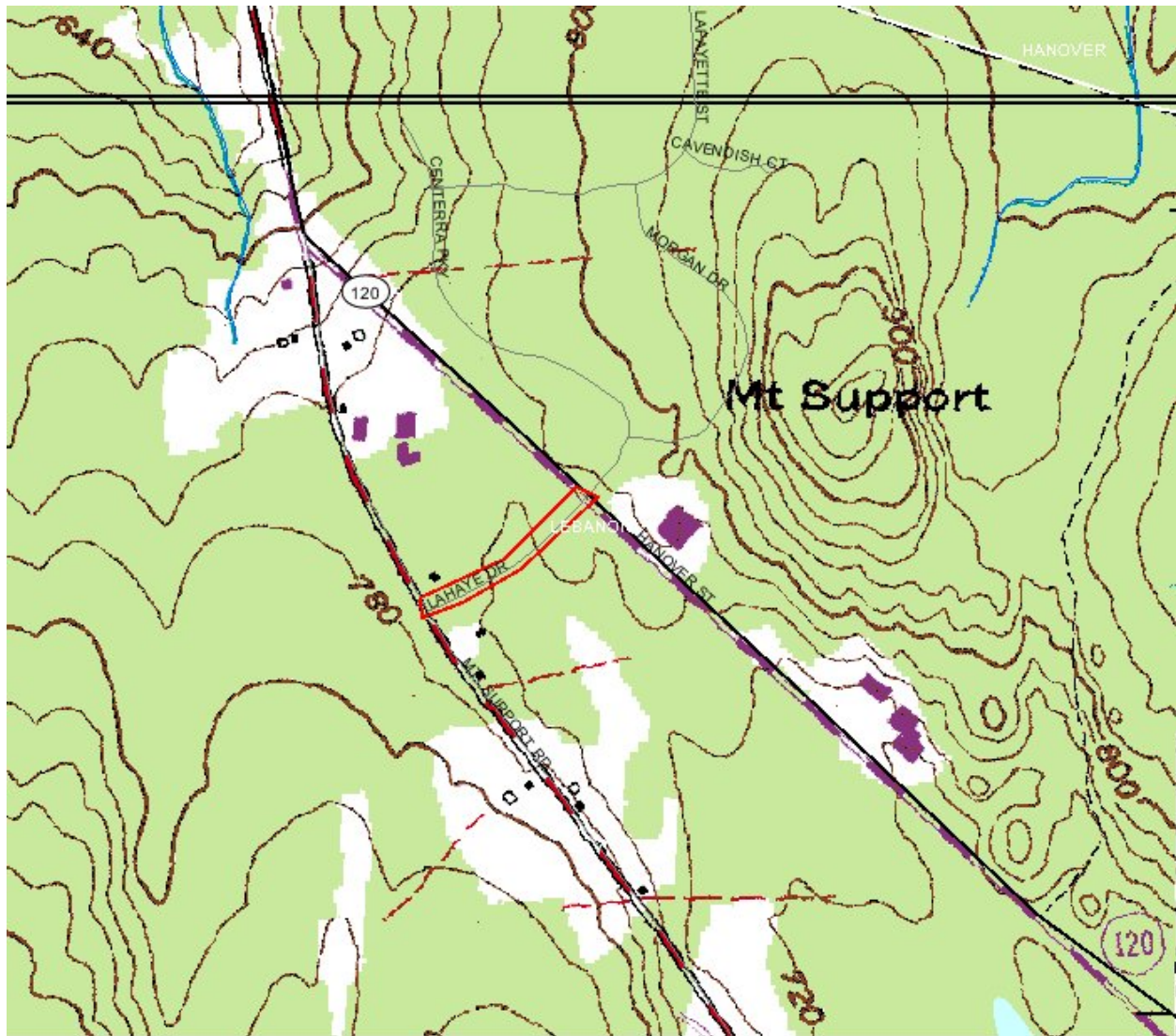
The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

This report is valid through 6/25/2019.



MAP OF PROJECT BOUNDARIES FOR NHB FILE ID: NHB18-2003



APPENDIX J

ARCHEOLOGICAL ASSESSMENT

PHASE IA ARCHEOLOGICAL INVESTIGATION
Lebanon Multi-Use Path

City of Lebanon
Grafton County, Vermont

HAA # 5244.11

Submitted to:

Darren M. Benoit, V.P.
Director of Transportation
DuBois & King, Inc.
18 Constitution Drive, Suite 8
Bedford, NH 03110
603-637-1043 ext. 4420
dbenoit@dubois-king.com

Prepared by:

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f +1 802 387 8524
email: emanning@hartgen.com

www.hartgen.com

An ACRA Member Firm
www.acra-crm.org

June 2018

ARCHEOLOGICAL RESOURCE ASSESSMENT

INTRODUCTION

Hartgen Archeological Associates, Inc. (HAA, Inc.) was retained by DuBois & King to conduct a Phase IA Archeological Investigation for the proposed multi-use path which measures approximately 950 feet long adjacent to Lahaye Drive between Mt Support Road and NH 120 in the City of Lebanon, Grafton County, New Hampshire (Map 1). The City of Lebanon proposes to construct pedestrian and bicyclist improvements along Lahaye Drive to better connect Dartmouth-Hitchcock Medical Center (DHMC) and the Centerra and Altaria Business Parks. Presently, there are a series of bike lanes/shoulders and separated, multi-use paths either extant or approved for construction in association with surrounding development projects. However, there remains a significant gap in connectivity between Mt. Support Road and NH Route 120, particularly for those walking or biking to and from the south along the Mt. Support Road multi-use path.

The project is being funded in large part by the New Hampshire Department of Transportation (NHDOT) Transportation Alternatives Program (TAP) grant, with smaller funding contributions from Dartmouth College, Dartmouth-Hitchcock Medical Center (DHMC) and the City of Lebanon.

The primary objective of the Phase IA is to identify areas of archeological sensitivity based on environmental factors, known site information and historical information for the project Area of Potential Effects (APE) (Map 2). Study of the physical environs and investigation of the cultural history of the area allow the project area to be viewed within its environmental and cultural contexts. Background research into the area's history and study of the archeological site files, including previous archeological studies and identified archeological sites, reveal the number and type of sites which are to be anticipated within this region and environmental setting.

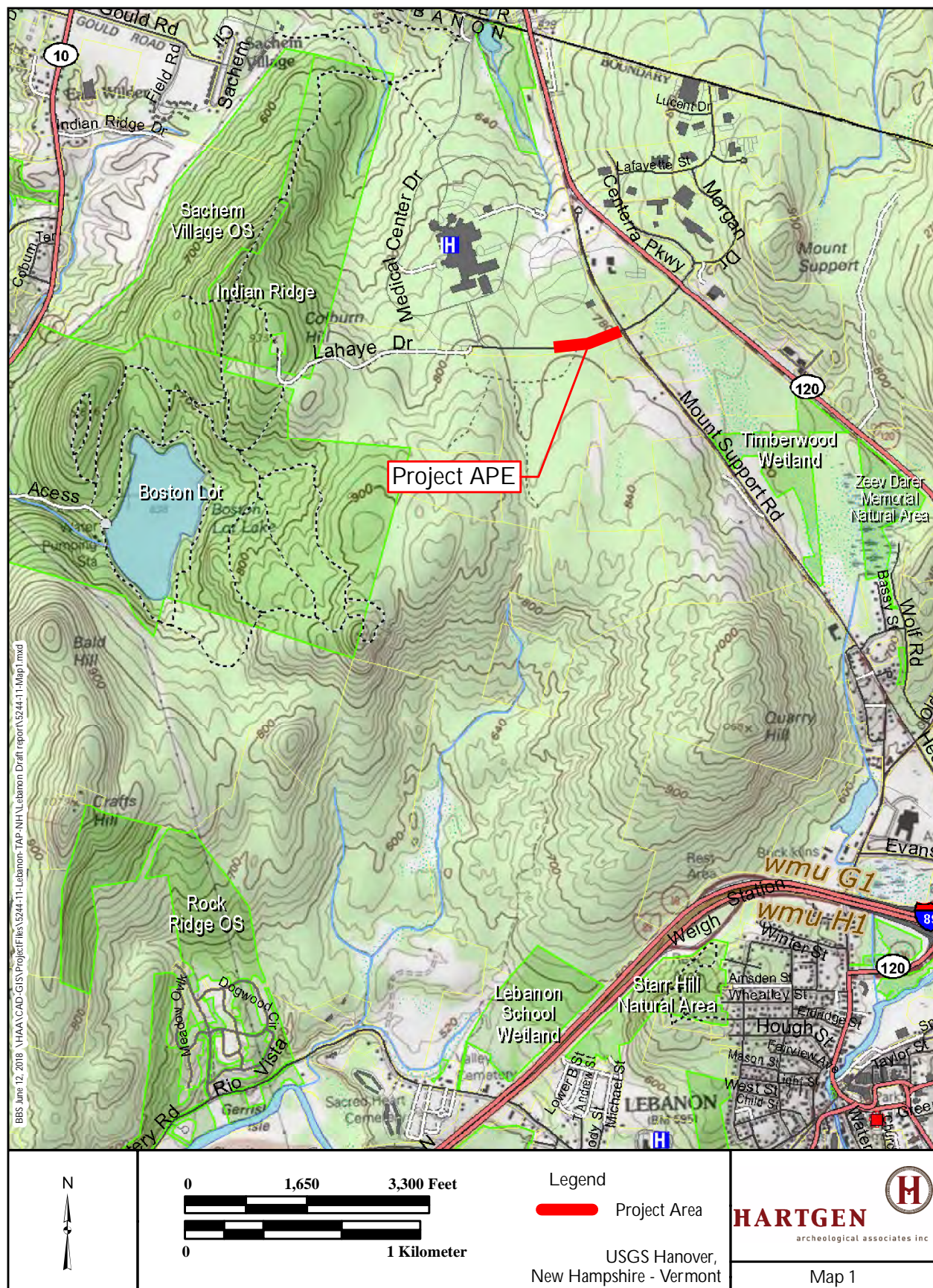
The archeological investigation included research into the historic and precontact use of the project area and its environs, including the investigation of archeological site files. The literature review for historic and precontact sites included research at the NHDHR included study of archeological site files to identify sites within, or located several miles distant from the project area. Research at the New Hampshire State Library included study of historical maps within their collections. A site visit was conducted by Elise Manning Sterling to observe and photograph existing conditions within the project area.

Environmental Overview and Current Conditions

Environmental characteristics of an area are significant for determining the sensitivity for archeological resources. Precontact and historic groups often favored level, well-drained locations near wetlands and waterways. Therefore, topography, proximity to wetlands, and soils are examined to determine if there are landforms in the project area that are more likely to contain archeological resources. In addition, bedrock formations or other lithic sources may contain resources that may have been quarried by precontact groups. Other locations can also be special purpose sacred and traditional use sites. Soil conditions can provide a clue to past climatic conditions, as well as changes in local hydrology.

The project area is situated within the Connecticut River valley, at an approximate elevation 780 feet above mean sea level. On both sides of LaHaye Drive, there is a steep slope from the roadway down to wetlands. The wetlands are located in the central portion of the project area, with slightly higher level terraces to the east and west. The confluence of the Connecticut River and the Mascoma River is located approximately 2.5 miles (1.5 km) to the south. The wetlands within the project area are the headwaters of a small stream which flows northward into the Mink Brook, located approximately 1.5 miles (0.9 km) to the north.

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There are two primary soil types within the project area. The soils located on the level terraces adjacent to the wetlands is comprised of Pittstown loam, 3-8% slope, very stony which is moderately well drained soil situated 18 to 35 inches above the water table. The soils present in the wetlands areas are Stissing silt loam, 0-3 percent slope. This poorly drained soil class is situated at the water table (USDA 2018).

The project area is comprised of a section of LaHaye Drive which was built high above the surrounding landscape, which is comprised of wetlands and adjoining level terraces, located both to the north and south of the roadway. The wetlands are centrally located within the project area, with the slightly raised level terraces to the east and west. The level terraces adjacent to the wetlands are considered archeologically sensitive for precontact resources.

DOCUMENTARY RESEARCH

Precontact Site File Research and Archeological Sensitivity

Precontact Archeological Sites

The NH DHR site file search revealed that no recorded precontact sites are located within the project area. The archeological site files revealed the presence of several precontact sites located within a three mile radius of the project area, primarily located on major waterways, including the Connecticut River and the Mascoma River.

27-GR-0168 – Seminary Hill (NHAS Site #22-7)-The site is located approximately one mile (1.6 km) west of the APE, situated at 480 to 500 feet above mean sea level, located on a terrace overlooking the Connecticut River in West Lebanon. The site was identified in the 1930s through surface collection of a contracting stemmed chert projectile point. Quartz points were also plowed up in nearby fields. The cultural affiliation and age of the site was undetermined.

27-GR-0169 – Rix Ledges/Harley Camp (NHAS Site #23-1)- The Rix Ledges site is located approximately one mile (1.0 km) to the east of the APE, situated on a hillslope below Rix Ledges and situated overlooking a large wetland. The site, whose age and cultural affiliation is unknown, was identified in 1951 by the presence of lithic scrapers.

27-GR-0176 – True Farm (NHAS Site #22-3)- This precontact site is located at the confluence of the Connecticut River and Bloods Brook, several miles southwest of the project area. Some surface collection and shovel test pit excavation was conducted at the site. Most of the artifacts recovered from the site over the years are held in a family collection. Artifacts collected from the site include triangular and lanceolate projectile points, decorated and undecorated precontact ceramic fragments, lithic knives, scrapers, net weights, axes, a pestle, and lithic debitage (including chert, jasper, rhyolite, quartz, crystal quartz, hornfels, and quartzite). The age and cultural affiliation of this site is unknown.

27-GR-178 – Romano Place Site – A Woodland site identified in 1947 on the east bank of the Connecticut River in Hanover. The site produced pottery and a projectile point with a concave base.

27-GR-222 – Romano Place Site - The precontact site was located in West Lebanon on a level alluvial terrace of the Connecticut River. An archeological survey was conducted which identified both Middle and Late Woodland components, primarily represented by fragments of Native American ceramics, including rocker-dentate and cord-wrapped stick impressed decoration, a hammerstone, and a few pieces of lithic debitage.

27-GR-238 – Hardy Hill Brook Site- This site was identified along the lightly wooded eastern bank of Hardy Hill Brook north of Farr Road, situated approximately 3 miles southeast of the project area. The entire site assemblage consisted of five cord- or fabric impressed ceramics dating to the Late Woodland period.

Previous Archeological Surveys

Numerous archeological investigations have been conducted in the vicinity of West Lebanon and Lebanon, mostly within the last ten years. The majority of these studies incorporated shovel testing, however, none, except the Romano Place Site (GR-222), resulted in the identification of archeological sites (Booth and Wheeler 2007; Booth et al, 2006; Goodby 2007; Hartgen 2004, 2006; Sargent 1977; and Wheeler 2007, 2008).

A Phase IA preliminary archeological reconnaissance was conducted at the location of Exit 20 on Route I-89 at the confluence of the Connecticut and Mascoma Rivers. One area of precontact sensitivity was identified – an area delineated on the west by the Connecticut River, and on the east by Route 12A which measured approximately 350 feet east-west by 1,500 feet north-south. Phase IB testing was recommended within the archeological sensitivity area (Potter 1994).

A Phase IA archeological assessment was conducted for Sleeper Village on Old Pine Tree Cemetery Road, located south of the project area on the north side of the Mascoma River in West Lebanon (Wheeler and Marlatt 2006). The majority of the 132 hectare project area was determined to be comprised of low archeological sensitivity areas for precontact sites. Phase IB intensive archeological investigation was recommended for three areas located on upper terraces on the floodplain or along a stream.

Archeological testing was conducted for the Romano Circle housing project which resulted in the identification of the Romano Place Site, and designated as New Hampshire Site 27-GR-222 (Goodby 2008). The precontact site was located on a level alluvial terrace of the Connecticut River, located west of South Main Street in West Lebanon. The site was occupied in the Middle and Late Woodland periods. Testing produced over 100 fragments of Native American ceramics, including rocker-dentate and cord-wrapped stick impressed decoration, a hammerstone, and a few pieces of lithic debitage. Archeological recommendations included that the site be placed in a permanent preservation easement and fenced during construction to prevent any inadvertent impacts.

The study of previous archeological surveys and the location of known archeological sites within several miles of the project area indicates that the greatest number of sites are located adjacent to large bodies of water, including the Connecticut and Mascoma Rivers. Sites are located along the rivers, lake shores and associated wetlands, and on the edges of higher level terraces overlooking these waterways and their tributaries. Aside from the major waterways, it may seem that the area was utilized minimally in precontact times. While there is a dearth of reported sites in the immediate project area vicinity, this may be a result of lack of archeological testing rather than the actual absence of sites. Also, there may be known precontact sites that were never reported and officially recorded in the state archeological files. It is likely that precontact peoples made use of the river floodplains, as well as the raised terraces located above streams and wetlands in the Lebanon area.

Historic Site File Search and Archeological Sensitivity

National and State Register

There are no National Register sites located within or adjacent to the project APE. There are no known cemeteries located within or adjacent to the project area. There are no historic archeological sites located within the project vicinity or within one mile of the project area.

Historic Maps

A review of historic maps of the project area was conducted to attain an overview of the changing historical and environmental landscape within the project area. This review includes the study of historic structures that may be or may no longer be extant, alterations to road and rail systems, and changes in stream and river courses. One mid-19th-century map, the 1857 Walling map depicts the roadways and river and stream courses in the project area, as well as the names of the residents who lived there in those years. No historic structures are shown within or adjacent to the project area.

Archeological Potential and Sensitivity

A site visit was made to the Lebanon Multi-Use Path project area to assess the area's archeological sensitivity and identify areas of previous disturbance. LaHaye Drive is built up on fill to raise the level of the roadway above the surrounding terrain which is characterized as lowlying wetlands and lower terraces. These level terraces, at the base of the slope, and adjacent to the wetlands, are considered archeologically sensitive for precontact resources. If any of these areas will be impacted during the project improvements, then Phase IB archeological testing is recommended. This Phase IA archaeology report should be submitted to NHDHR archaeology officer for review and concurrence.

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APPENDIX K

EXISTING CONDITIONS PHOTOS



Photo 1: Existing Lahaye Drive North Side looking East



Photo 2: Existing Lahaye Drive North Side looking East



Photo 3: Existing Lahaye Drive North Side looking West



Photo 4: Existing Lahaye Drive North Side looking East



Photo 5: Existing Mount Support Intersection North side, looking East



Photo 6: Existing Mount Support Intersection South side, looking East



Photo 7: Existing Lahaye Drive South Side looking East



Photo 8: Existing Lahaye Drive South Side looking East



Photo 9: Existing Lahaye Drive South Side looking East



Photo 10: Existing Lahaye Drive South Side looking East



Photo 11: Existing Lahaye Drive South Side looking East



Photo 12: Existing Lahaye Drive South Side looking East



Photo 13: NH Route 120 Intersection North side, looking East



Photo 14: NH Route 120 Intersection South side, looking East



Photo 15: NH Route 120 Intersection South side, looking East



Photo 16: NH Route 120 Intersection Aerial Note that since this aerial, Lahaye Drive Eastbound has been changed to a double-right configuration

APPENDIX L

CRASH DATA

NHDOT Crash Data

2013: **5 crashes along the project area.** 1 crash along Centerra Parkway, 1 at the Loop Rd/ Mt. Support/ Lahaye Dr. intersection and 3 crashes at the NH Route 120 intersection

2014: **5 crashes along the project area.** 3 crashes along Centerra Parkway and 2 at the Loop Rd/ Mt. Support/ Lahaye Dr. intersection.

2015: **5 crashes along the project area.** 1 crash along Centerra Parkway, 1 at the Loop Rd/ Mt. Support/ Lahaye Dr. intersection, 1 crash at the NH Route 120 intersection and 2 crashes along Lahaye Dr.

2016: **9 crashes along project area.** 3 crashes along Centerra Parkway, 2 at the Loop Rd/ Mt. Support/ Lahaye Dr. intersection, 3 at the NH Route 120 intersection and 1 along Lahaye Dr.

2017: **5 crashes along project area.** 4 crashes along Centerra Parkway and 1 at the Loop Rd/ Mt. Support/ Lahaye Dr. intersection.

City of Lebanon Police

2016 13 Crashes, Property Damage Only (PDO)

2017 11 Crashes, PDO

2018 21 Crashes, PDO

2019 0 Crashes

No Pedestrian or Bicycle Crashes